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Cover:

After two years of planning, birds of paradise will once again be exhibited at the Bronx Zoo, re-establishing the Zoo's historic connection with this magnificent avian family. In 1929, Curator of Birds Lee Crandall concluded a seven-month expedition to Papua New Guinea that resulted in one of the finest collections of these birds ever assembled. In late June 1982, Curator of Ornithology Donald Bruning revisited the site and captured several birds of paradise, including the Raggiana shown here in full courtship display, along with other exotic specimens.

The acquisition of these rarely exhibited birds, which are found only in New Guinea and nearby islands, is part of a larger program that involves captive breeding at the Zoo and in cooperation with other zoos, and an effort to preserve many of the approximately forty species in their native habitat. Preserves have already been planned in New Guinea, with counsel from Dr. Bruning, and the New York Zoological Society will play an important role in the conservation effort through the sponsorship of its Animal Research and Conservation Center.

New York Zoological Society  
Bronx Zoo  
Bronx, New York 10460







### Profile of the New York Zoological Society

Founded in 1895, the New York Zoological Society consists today of six major divisions operating facilities in the United States and worldwide: the New York Zoological Park (Bronx Zoo); the New York Aquarium and Osborn Laboratories of Marine Sciences in Brooklyn; the Wildlife Survival Center on St. Catherines Island, Georgia; and the Animal Research and Conservation Center (ARC), headquartered at the Bronx Zoo; and the City Zoos in Central Park, Prospect Park, and Flushing Meadow Park, soon to be renovated and managed by the Society. ARC supports active research projects in countries ranging from the People's Republic of China to Zambia, and maintains stations in the Kibale Forest, Uganda; Valdes Peninsula, Argentina; and Amboseli National Park, Kenya. The Society's staff of 390 in all divisions includes curators, educators, veterinarians, animal keepers, research scientists, writers, administrators, artists and designers, photographers, gardeners, technicians, and a host of other support and maintenance specialists.

The Bronx Zoo and New York Aquarium are sensitive and popular tools for teaching environmental education in the nation's urban capital. Serving a metropolitan New York population of more than 17,000,000, as well as visitors from around the world, they combine nature, recreation, and education as do no other city institutions. In particular, they seek to arouse an interest in wild creatures and to stimulate compassion for them. In recent years, the captive collections of the Zoo and Aquarium, totaling more than 23,000 individual animals, have begun to fulfill a new, if unwanted role as long-term repositories for vanishing species, sustaining and perpetuating rare and delicate creatures which are disappearing in nature.

The Wildlife Survival Center, founded in 1974, is wholly devoted to the propagation and study of endangered species, and acts as a kind of distribution center for the renewal not only of zoo collections but also of nature itself.

The Osborn Laboratories of Marine Sciences, adjacent to the Aquarium and an integral part of its programs, has devoted its resources since 1968 to basic studies in the mechanisms of heredity, to the characteristics and cure of fish diseases (with a special view toward the application of this work to aquaculture), and to broad investigations in marine ecology.

The objective of the *Animal Research and Conservation Center* is to save pieces of nature. ARC is the country's senior non-governmental program sponsoring international wildlife conservation and research. As George Schaller, ARC Director, has written, "We strive to obtain a better understand-

ing of the structure, functioning and stability of large ecosystems and to apply this understanding to their conservation." ARC's distinctive approach has already resulted in the creation, enlargement, or strengthening of nearly fifty reserves and parks, and in the education of many to whom the future is entrusted.

The *City Zoos Project*, now in progress, will magnify the Society's public service throughout the New York metropolitan area, creating an entirely new and modern system of wildlife management and exhibition facilities, with emphasis on educational opportunities for children and adults alike. The three zoos are scheduled to be renovated and reopened by the end of the 1980s.

### 1982-83 Highlights and Vital Statistics

Attendance totaled 2,032,807 at the Bronx Zoo and 460,132 at the New York Aquarium between July 1, 1982, and June 30, 1983.

Membership in the Society reached 26,100, and about 40,000 individuals, foundations, and corporations contributed \$7,505,000 in dues and gifts.

Born or hatched at the Bronx Zoo, New York Aquarium, and Wildlife Survival Center were 1,450 mammals, birds, reptiles, amphibians, and fish, among them individuals of thirty-eight endangered, threatened, and vulnerable species.

Noteworthy births and hatchings included E.P., female California sea lion; Zachary, male dromedary camel; four baringo giraffes named Margaret I, James II, James III, and James IV; Feedback, pink pigeon; two Siberian tigers; five snow leopards; eight slender-horned gazelles; sixty-five cranes of various species; fifteen Indian rock pythons; and fourteen Malagasy radiated tortoises.

New Bronx Zoo exhibitions featured the South American pudu and the New Guinea Fly River turtle. The Aquarium opened its renovated beluga whale tank and exhibitions of invertebrates and coral reef fishes.

Projects now under construction are the new animal hospital and the Jungle World exhibitions at the Bronx Zoo. The snow leopard survival station at the Zoo, the Aquarium's Discovery Cove, and the City Zoos Project are in various stages of planning.

The Animal Research and Conservation Center sponsored fifty-six projects in twenty-eight countries around the world, including new efforts in Papua New Guinea, Belize, Mexico, Wyoming, Peru, and Ethiopia.

More than 100 scientific articles and papers were published or delivered by NYZS staff and associates.

# New York Zoological Society Annual Report 1982-83



Cover:

*A study of jaguars in Belize is one of three research projects on this fabled New World big cat now being conducted by New York Zoological Society field scientists in Central and South America.*

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At exactly midpoint in the fiscal year represented by this report—December 31, 1982—the New York Zoological Society completed the most successful capital campaign in its history. Aided by the remarkable gift of Mrs. James Walter Carter, the Animal Kingdom Campaign, launched in 1976, even surpassed its \$20,000,000 goal, achieving a total of \$20,484,000. In these recent years of "Zoo Renaissance" and Aquarium development, funds raised by the Campaign have provided a lifeline, not only for the Society's general endowment but also for such major projects as the immensely popular new Children's Zoo, the historic City Zoos Project, capital planning at the Aquarium, and the Carter Giraffe Building.

The purpose of Mrs. Carter's recent gift was the establishment of endowed chairs in the areas of marine biology, mammalogy, and conservation. The Carter Chairs will allow three distinguished scientists associated with the Society for many years to pursue work in their respective fields: Dr. George D. Ruggeri in Marine Sciences, James Doherty in Mammalogy, and Dr. David Western in the Conservation Biology of East African wildlife. These are the first chairs to be proffered by a zoological institution, and we hope they will serve as a precedent for supporting other important activities, such as zoo education and zoological medicine.

The Trustees owe a great debt of gratitude to those who worked with such inspiration on the Campaign, especially to its founding Chairman, the late George F. Baker II; his successor, John N. Irwin II; and to vice-chairmen Mrs. Vincent Astor, John Pierrepont, and John T. Sargent. Gifts of \$1,000,000 and more from Mrs. Carter, Mrs. Astor, Lila Acheson Wallace, Laurance S. Rockefeller, Enid A. Haupt, Betty Wold Johnson, and Louise C.P. Marshall, along with the many other contributions from individuals, foundations, and corporations, were indispensable to the successful completion of this effort.

Capital giving did not end with the Animal Kingdom Campaign, however, as the Society received an additional \$539,000 after its completion, much of it directed to funding the new animal hospital at the Bronx Zoo. Contributions from Trustees Frederick W. Beinecke, Mrs. Haupt, Frederick A. Melhado, Charles Nichols, Jr., Richard Perkin, and David T. Schiff; from Advisors Alice Tully and Mrs. Wallace; from





Dr. George D. Ruggieri, Director of the New York Aquarium and Osborn Laboratories of Marine Sciences, and holder of the Carter Chair of Marine Sciences.



James G. Doherty, General Curator and Carter Curator of Mammalogy.

David Rockefeller, The Thorne Foundation, and the Pfizer Foundation; and from many other donors, including those responding to a direct-mail campaign, supplemented the substantial backing already provided by the City of New York for the new hospital. No project is more vital to the Society's future—to the care of its animal collections, the management of the City Zoos, and the advancement of research—than this facility, and its opening in late 1984 will be welcomed by all who care about that future.

Including Animal Kingdom Campaign and other capital donors, who gave a total of \$4,207,000 during the fiscal year, the Society now numbers some 40,000 members and contributors. Adding \$2,436,000 received for operating or budgetary purposes and membership revenues of \$862,000, the total of all giving was \$7,505,000, a sum that reflects the energetic and dedicated participation of volunteers and staff.

On behalf of the Board of Trustees, I would like to formally thank all those who have given their time and energy to furthering the Society's programs and fund-raising efforts. The Business Committee, under its new chairmen Arthur Hauspurg and Peter C.R. Huang, led an effort that resulted in gifts of \$488,000 from 200 corporate donors. Notable contributions were received from Con Edison, Chase Manhattan Bank, and the Philip Morris Company, which for the second successive year donated thirty billboards around New York City for new Zoo and Aquarium advertising.

Year after year the Women's Committee has been an unfailing source of commitment and support. Under the leadership of outgoing Chairman Mrs. Joseph R. Siphron, the Committee's activities culminated in a fund-raising dinner dance at the Zoo on June 8. With incoming Committee Chairman Julie Kammerer serving as Chairman of the event, Mrs. Vincent Astor and Mrs. Charles W. Nichols, Jr. as honorary chairmen, and the Rajmata of Jaipur as International Chairman, "Night of the Snow Leopard" was able to provide more than \$200,000 of the Committee's pledge toward the planned exhibition for that endangered species at the Zoo.

Another benefit, held on October 22, raised more than \$100,000 for the Aquarium and for the research of the Osborn Laboratories of Marine Sciences. Particular thanks go to Edward Zigo, who chaired the dinner dance for the seventh year. Meanwhile, the role of the Aquarium and Osborn Labor-





Dr. David Western, ARC Resource Ecologist and Carter Chair of Conservation Biology.

atories Planning Committee has grown under Chairman Dr. Henry Clay Frick II, and funds raised by the Committee have shown a dramatic increase as the Aquarium begins an exciting new period of capital planning.

Sadly, the Society must report the death of Mrs. William Ward Foshay, a valued friend and Trustee since 1974. She was the first woman to serve as a Vice-President of the Society, which she did from 1976 to 1981. A member of several committees during her tenure, including the Executive and Conservation Committees, she was a great supporter of the Society's international program and acted as a liaison between the Women's Committee and the Board of Trustees.

Welcomed as a new member of the Board is John R. Hearst, who continues to serve on the Aquarium and Osborn Laboratories Planning Committee. The Society's distinguished group of Honorary Trustees has been joined by Mrs. James Walter Carter.

The year has been one in which the Society's captive breeding program has achieved unprecedented success, in which its role in crucial interzoo projects has grown, and in which its educational and international conservation activities have reached a new level of recognition and effectiveness. For accomplishments in these and many other areas, and for the comprehensive planning for the future that is now going forward, we are grateful for the leadership of General Director William Conway and for the talent and enthusiasm of the Society's multifaceted staff.

**Howard Phipps, Jr.**  
President



### **Understanding jaguars and educating children**

A jaguar's jaws are fearsome. NYZS scientist George Schaller has found that its canines are capable of piercing the thick helmet-like brain-case of that giant ninety-pound rodent, the capybara, with one bite. The jaguar is big, the largest western hemisphere cat and, after the tiger and lion, the most powerful of its clan. A few have come as far north as the United States, in times past. Twenty-three thousand three hundred forty-seven were killed for the United States skin market in 1968-69. But, until Schaller studied them, virtually nothing was known about jaguars—except that they are disappearing. More is known about American schoolchildren, almost too much more.

The New York Zoological Society is interested in jaguars *and* schoolchildren. Therefore, we are concerned that the April 1983 report of The National Commission on Excellence in Education, citing widespread illiteracy and lack of training among young Americans in such high-level skills as biology, mathematics, and even English, lamented what it termed the "rising tide of mediocrity that threatens our very future as a nation and as a people." As institutions in this nation go, the Zoological Society is not large. It has but 390 full-time employees, but it also has a peculiarly effective combination of specialties. It is actually helping to do something about schoolchildren, about jaguars, and about much more—effectively.

### **International conservation**

Although lions and leopards, tigers and cheetahs have all been persistently if not completely studied, jaguars have not. Living in dense forest or scrub, or along forest edges, they are difficult to see and hard to follow. Now, in Belize, Brazil, and Peru full-fledged NYZS field studies are underway in widely differing habitats where jaguars subsist on very different prey and are subjected to varying pressures from man. Among the objectives of these studies is identifying ways man and jaguar can continue to live together, a characteristic goal of each of the nearly sixty projects being conducted from Argentina to Zambia by the Society's Animal Research and Conservation Center, the senior non-governmental international wildlife conservation program in the United States.

Among the most challenging of these projects is providing leadership for the African Elephant and Rhino Specialist Group of the International Union for the Conservation of Nature.



Jaguars in Belize, Brazil, and Peru are under study by NYZS field scientists.

NYZS Resource Ecologist David Western has taken on this task, and the Society's Nairobi office is acting as a center not only for gathering status and problem reports on the great creatures from throughout the continent but also for coordinating conservation responses by affected nations and by our colleagues in such equally concerned organizations as the African Wildlife Foundation and the World Wildlife Fund, International. The urgency of the task is apparent within a single statistic; ninety percent of Africa's black rhino population has been killed during the past ten years.

In China, ARC Director George Schaller continues his remarkable research on behalf of the World Wildlife Fund's Giant Panda Project, and a host of other projects ranging from a new NYZS initiative to protect the threatened mountain gorillas of Uganda's famed Impenetrable Forest to protection for the re-discovered Wyoming toad have characterized an extraordinarily effective year (pp. 39-43).

### **WOW, ZIP, and WIZE**

"WOW," "ZIP," and "WIZE" are not examples of the inarticulate croaks of mediocrity lamented by the National Commission on Excellence in Education but just the opposite; acronyms for programs of educational excellence. They constitute not only an outstandingly coherent and progressive approach to using the educational resources of the Bronx Zoo, but also a promising initiative in using zoos to improve biological science education nationwide by the country's premier zoo education department.

WOW ("Windows on Wildlife") is an environmental science program for grades three through six on endangered species and their habitats. It is school-class oriented and provides not only preparatory workshops for teachers and classroom preparation and follow-up materials, but also topic booklets, exercises, and in-zoo training. The entire program was originally made possible by the Charles E. Culpeper Foundation but it is now self-supporting, no easy feat for an educational effort. ZIP provides "Zoo Information Packs" to elementary school teachers who can obtain, completely free thanks to the support of the William Randolph Hearst Foundation, an imaginative and carefully tested package of instructional materials on how to use the Bronx Zoo. The last of four sections will be completed late in 1983 and will provide an organization and coherence to the class visits of more than 300,000 students who come to the Zoo each year. The most ambitious program,



WIZE ("Wildlife Inquiry Through Zoo Education"), is now completing its developmental phase. Carefully structured for sixth- through ninth-grade students, it seeks to motivate a new generation to pursue studies in the life sciences—and to think about the issue of the survival of other species into the next century.

### **The collections—growing responsibilities**

About 1,450 living mammals, birds, reptiles, amphibians, and fishes, not to mention countless aquatic invertebrates, were bred in the Society's collections at the Zoological Park, the Aquarium, and the Wildlife Survival Center. Offspring ranged from giraffes to radiated tortoises, from crocodiles to snow leopards and included a pink pigeon, eleven wattled cranes, and eighty-four Pacific octopuses. Represented were thirty-eight species now designated "rare," "threatened," or "endangered" in nature.

With each year, the proportion of wild creatures whose status warrants these grim designations increases, and with it the realization that the fact of wildness, if not the concept, is itself disappearing. In the now foreseeable future, there will be almost no truly "wild" areas that can provide, without intervention, the space and ecological independence necessary to sustain healthy populations of large wild animals. Inexorably, nature reserves seem doomed to become "megazoo," their wildlife populations carefully cared-for and balanced against disease, diminished resources, and the needs of other species, including man. The loss of earth's genetic resources will have profound implications for humankind. Eventually it may affect man's ability to feed himself and to cure himself, even to successfully occupy parts of the earth's surface. Institutionally and immediately, the implications for zoological gardens and aquariums are also profound, and public perceptions of zoo collection responsibilities are rapidly changing.

Preservation in nature is the objective of wildlife conservation. Preservation in captivity can be only a last resort. On the other hand, it has become likely that the techniques of zoo care, and perhaps the collections themselves, will prove essential to the genetic and demographic maintenance of undersized nature reserve populations. Such possibilities impose awesome obligations upon institutions founded in a museum "show and catalog" tradition. The zoo as we now know it is only the beginning of a new kind of collaborative national institution. (See "Species Survival Plan," pp. 14-15).



Direct contact with wild creatures remains an important part of the Society's broadening educational program.

### Planning and exhibition

At no time in the Society's history has more exhibition planning been underway. At the Aquarium, a new concept is taking shape under the working title "Discovery Cove." Conceived as a response to studies devoted to family learning in an aquarium setting, the planning effort has required a whole new look at the Aquarium's future development program. At the Zoological Park, a staff-wide consideration of the great Zoo Court's future has resulted in such an exciting concept overload that months have been required to achieve a realistic focus. The schematic program preserves the handsome beaux-arts character of the Court's turn-of-the-century buildings while replacing their antiquated exhibits in a way that will again make Zoo Court, as it once was, the center of the Zoo. Besides these general projects, an intensive study of the Zoo's future energy needs has progressed under the supervision of Kathleen Wilson and David Cole and with the aid of the Center for the Biology of Natural Systems. Meanwhile, an increasingly exciting exhibition program is advancing in Jungle World, scheduled to open in 1985.

### Horticulture

Imagine the great exhibits of our 265-acre Zoological Park without plants, exhibiting animals on concrete, gravel, or bare earth. In fact, that is the way many of its animals were exhibited twenty-five years ago and the way they still are in some zoos. The magnificent trees of the Bronx Zoo, outside the animal enclosures, relieved the original severity of its old-fashioned exhibits, often deliberately kept bare for reasons of sanitation. Today, the Zoo's tropical forest bird displays are lush tropical forests, while its savanna animals graze on grassy savannas.

However, as the Zoo has become more natural and green, the ability to provide adequate care and planning for such displays has also become more important. Accordingly, a horticulture department has now been founded.

Timothy Hohn, the first Longwood Garden Fellow to take a graduate degree in "zoo horticulture," is the Society's first curator of horticulture. The support gardening staff is developing within the Zoo's maintenance division.



The first pink pigeon chick to be raised in North America, three days after cracking its shell.



NYZS Honorary Chairman Laurance S. Rockefeller, Advisor Mrs. Gordon Pattee, and Trustees John Elliott, Jr., Frederick W. Beinecke II, John Pierrepont, and Enid A. Haupt inspect exhibition construction at Jungle World.

### **Government support**

Under a historic partnership with the City of New York, the Society provides the collections and the municipal budget provides funds for their care, supporting personnel in animal management, security, and maintenance, as well as most of the utility expenses at both facilities. Through the Department of Cultural Affairs, the City appropriated \$5,858,236 for Zoo and Aquarium operations in fiscal 1983.

The City's capital budget program continues to underwrite a series of rehabilitation and improvement projects. In fiscal 1983 the Zoo commenced work on the new animal hospital, supported with a \$3,300,000 City appropriation. Aquarium projects included structural repairs to the white whale tank; a new gas line and emergency generators; and protective covering for the Marine Mammal Holding Facility. Among new projects approved for fiscal 1984 is the rehabilitation of the Aquarium's seawater intake system.

Declining revenues forced the State to cut its expenses across-the-board, including a \$250,000 decrease for the Society. The Natural Heritage Trust, a program of the New York State Office of Parks and Recreation, appropriated \$970,000 toward general operating expenses.

Federal support for science museums is the focus of a special project by the American Association of Museums. The Zoological Society is working with the AAM, the American Association of Zoological Parks and Aquariums, and other allied organizations to make the case for museum funding.

### **Proceeding in style**

Retrospection is the one essential of any annual report. I found it an excuse to look back over some of the fascinating photographs which have illustrated eighty-seven years of Zoological Society reports. Changes in visitor styles and tastes, vehicles, and even buildings strike the eye but, be they big, tiny, strange, or elegant, all the animal life looks the same. The New York Zoological Society—its trustees, staff, and members—is dedicated to seeing that life does not go out of style.

**William Conway**  
General Director



Endangered NYZS animals designated as part of the inter-zoo Species Survival Plan are the white-naped crane, which produced eleven chicks at the Zoo last year . . .

Not many years ago, zoos competed to exhibit the greatest possible number of species to their visitors. They were living museums. But, the care of living creatures imposes special responsibilities and the exhibition of great numbers of species meant that keeping large long-term breeding groups was impractical. There was not enough room. With the realization of what was happening to wildlife in nature, as humans began to populate even the remotest regions of the earth, the establishment of breeding zoo groups became a paramount concern and cooperation between zoos replaced competition. Now it has become clear that cooperation without careful coordination is not enough either—and there still is not enough room; hence, the Species Survival Plan of the American Association of Zoological Parks and Aquariums.

"The SSP is a logical outcome of the broadening of the zoo mission from education and recreation to the preservation of vanishing wild animals," says one of the opening sentences of the Association's draft plan. It is a response to conservative predictions that fifteen to twenty percent of all the earth's living species of plants and animals will be lost by the end of the century and many more will be dangerously diminished as a consequence of human population increase and the development of wild and marginal lands.

Specifically, SSP seeks to strengthen and coordinate captive propagation efforts:

1. By providing the means to reinforce natural populations which may have been reduced by catastrophe or disease, or which may have become so small that they are no longer viable.
2. By providing animals for repopulation of original habitats when that proves practical.
3. By establishing refuges for species destined for extinction in nature.
4. By maintaining repositories of germ plasm in addition to populations of wild animals.
5. By conducting research and developing more successful techniques of animal husbandry in support not only of captive propagation but also of the care of faltering populations of wild animals in nature.

But objectives do not overcome the basic problem of lack of space. All the zoos in the nation occupy scarcely 20,000 acres. The zoo Ark will have to be a selective one if viable popula-





the Siberian tiger, this one born in May 1983 . . .

and the Chinese alligator, successfully breeding in a cooperative project at the Rockefeller Wildlife Refuge for the third year.



tions of significant numbers of animal kinds are to be sustained. For this reason the SSP has established three basic criteria for including species in the Plan:

1. A breeding nucleus of the species or subspecies must be available for captive management.
2. The species' or subspecies' continued existence in the wild must be in some degree of peril.
3. There must be available an organized group of captive propagation professionals with sufficient support to develop and carry the species or subspecies program to captive preservation status.

Wild animal species not currently in captivity but meeting SSP inclusion criteria are of particular concern to SSP if they are immediately in danger of extinction or the single representative of a taxonomic family or genus.

Beyond being selective, the Species Survival Plan will attempt to manage available zoo space to see, for instance, that an excessive number of jaguars or white rhinos does not occupy room needed for snow leopards or Indian rhinos. By establishing volunteer "Species Propagation Groups" and obtaining written agreements from zoos holding each designated species, the plan is attempting to assure that each species will breed at a predictable level with a population large enough and managed in ways designed to minimize the loss of genetic variability. While advancing research on improved animal care and management, SSP will attempt to advance the application of reproductive technologies to wild species—techniques such as artificial insemination, embryo transfer, and long-term storage of frozen gametes.

Already animals worth hundreds of thousands of dollars are being shifted from collection to collection without recompense to their owners, solely in order to enhance their breeding opportunities. Institutional sovereignty over cherished specimens and even exhibits is being relinquished, as long-term values win ascendancy over short-term gains. Virtually every zoo director and curator in North America is giving of his time. NYZS has played a seminal role in the founding and development of SSP, which has become an extraordinary effort in professional voluntarism and inter-institutional collaboration. There are few precedents, and few alternatives.

**William Conway**



### **Year of the snow leopard**

On June 8, 1983, the New York Zoological Society Women's Committee held an extremely successful benefit to raise funds for a snow leopard survival station at the Bronx Zoo. The proposed exhibition and modern breeding facility will be located in a wooded glen between the bear exhibitions and the World of Darkness, an area designated for species of northern latitudes.

Plans call for three separate exhibits with attractive overlooks designed to give the visitor a view of this mysterious Asian cat, whose sparse mountain population ranges from the Hindu Kush in Afghanistan to the Uspugul region of Mongolia. Several animals will appear in a wooded area, in a cave-like setting, and in natural surroundings alongside some natural prey species (varieties of pheasants). Behind the exhibits, an extensive breeding facility will accommodate up to eighteen snow leopards, including offspring. The enclosures will include private quarters monitored by remote closed-circuit television to allow twenty-four hour observation as well as the security and privacy needed for successful reproduction. The overall complex is scheduled for completion in 1985.

Important international meetings concerning snow leopards took place in May, when Registrar Danny Wharton represented the United States and the Bronx Zoo as one of a delegation of four scientists visiting the Moscow and Alma-Ata zoos in the Soviet Union. Arrangements for an exchange of information were agreed upon, as well as the exchange of up to six animals. This program will boost genetic representation in the United States with an infusion of wild-caught males while increasing the number of females in the U.S.S.R.

These developments highlight the Society's long history of association with the snow leopard, which was first exhibited at the Bronx Zoo in 1903. The species was not successfully bred in the Bronx until 1966, but since that time more than thirty cubs have been born in the breeding program, including five cubs this year. This places the Bronx Zoo among the top three breeders of snow leopards in the world (Helsinki leading the way with well over fifty births). Bronx-bred snow leopards have already been sent to fourteen other institutions, with the latest shipments of young females going to zoos in Great Britain and Holland, as well as the United States. Three cubs born to Rose on May 30, 1983, represent six generations of captive breeding—a snow leopard family tree unequalled anywhere.

### **Astor**

August 20, 1981, was the birth date of Astor, the first Asian elephant ever born at the Bronx Zoo. The 250-pound youngster was a significant achievement for the Mammalogy Department, the result of years of work and planning since Astor's parents arrived from India as youngsters themselves in 1973. Astor became a personality almost overnight, delighting the tens of thousands of visitors who came to see him. He also charmed his keepers with his playful antics and mischief and developed a strong bond of affection and respect with his caretakers.

The young elephant had grown dramatically, more than tripling in weight by the time he was a year old. Unfortunately, he also developed an undetected heart ailment that resulted in his death on January 26, 1983, at almost a year-and-a-half of age. Everyone connected with the Society was saddened by this great loss. Sympathy cards poured in from throughout New York and the country expressing sorrow over the death of Astor.

### **Preserving the pudu**

About the size of some terriers, the pudu is the world's smallest deer, standing barely fifteen inches at the shoulder and weighing less than twenty-five pounds. In April 1983, the first group of pudu ever to enter the United States arrived safely at the Bronx Zoo from Chile. The four ani-



NYZS conservation efforts in Chile and Argentina are reflected in the Zoo's new pudu exhibition.





Among the most productive snow leopards in captivity, Shanda has produced fourteen cubs at the Zoo since 1978.

mals are now settled in their new home just south of the Great Ape House in the geographic center of the Park.

Through a curatorial research fund, Society personnel have studied the behavior and ecology of the puma since 1978 in Argentina and Chile, where arrangements have been made to preserve these creatures in their native habitats. Under the direction of Associate Curator of Mammalogy Mark Mac-Namara, two captive breeding programs have been established: on Isla Victoria in Nahuel Huapi National Park, Argentina, and at the LaDehesa estancia near Santiago, where the Zoo's recent arrivals were born.

#### Staff activities

Late in 1982, Mammalogist Laurel Keller left the Mammalogy Department to complete work on her PhD degree in Chicago. About the same time, long-time Mammalogy Supervisor Dick Bergmann retired, and Senior Keeper Penny Kalk moved up to the position of Assistant Mammal Supervisor.

General Curator and Curator of Mammalogy James G. Doherty was named recipient of the James Walter Carter Chair in Mammalogy. This generous gift to the New York Zoological Society is from Mrs. James Walter Carter.

#### Mammal Census, Bronx Zoo (as of Dec. 31, 1982)

Order	Families	Species and subspecies	Specimens in Park	Specimens owned
Marsupialia—Kangaroos, phalanger, etc.	2	4	65	68
Insectivora—Shrews, hedgehogs	1	1	2	2
Chiroptera—Bats	3	9	423 ±	435
Primates—Apes, monkeys, marmosets, etc.	6	24	147	158
Edentata—Armadillos, sloths, anteaters	3	3	5	4
Rodentia—Squirrels, mice, porcupines, etc.	11	23	199 ±	198
Carnivora—Bears, raccoons, cats, dogs, etc.	6	27	91	92
Pinnipedia—Seals, sea lions, etc.	2	2	6	7
Proboscidae—Elephants	1	2	7	8
Perissodactyla—Horses, rhinoceroses, etc.	3	6	38	28
Artiodactyla—Cattle, sheep, antelope, etc.	8	32	517	545
<b>Totals</b>	<b>46</b>	<b>133</b>	<b>1,500 ±</b>	<b>1,545</b>

N.B. Specimens in Park include 39 on loan to the NYZS from other collections. Specimens owned include 86 on loan to other collections from the NYZS. There were 32 endangered species in the collection. Births for 1982 totaled 779.



### Birds of paradise

Birds of paradise are once again on exhibit at the Bronx Zoo. The Society was noted for its collection of these magnificent species for nearly forty years, from 1929, when Curator Lee Crandall brought back a large group of birds from Papua New Guinea, to 1968, when the Zoo's last specimen died. Planning for the recent expedition under Curator Donald Bruning began three years ago and came to fruition in July 1982, when five birds of paradise were collected for the Zoo with the assistance of personnel from the Baiyer River Sanctuary.

In October, Dr. Bruning returned to Papua New Guinea with Supervisor Gus Waltz to collect more birds, and these arrived in New York in January from the USDA quarantine station in Hawaii. With the addition of a small group of birds acquired from the Howletts Zoo in England, the Society now has a total of thirteen birds of paradise, including one Emperor of Germany, three Raggianas, three reds, two magnificents, one Queen Carola's Parotia, one Wilson's, and two lesser birds of paradise.

A third expedition began in May, this time with Supervisor Eric Edler accompanying Dr. Bruning and curators from the Denver, Philadelphia, and National zoos. Edler planned to remain in Papua New Guinea until July when he would escort birds back to Hawaii.

### Other acquisitions

Additions to the collection, most of them incorporated into the breeding program, came in unprecedented numbers and variety over the past year. Shipments of birds were received from Jorong Bird Park in Singapore, the zoo in Hong Kong, a collector in Bolivia, and several European sources. A new pair of Congo peacocks arrived from Antwerp, a wattled crane and hornbill from Rotterdam, and a shipment of hornbills from Burma through a dealer in Belgium. However, the largest single acquisition in recent years came from Zimbabwe in May. Included were wattled cranes, rails, jacanas, barbets, parrots, hemipodes, and a variety of wydahs and bishops—more than 100 birds.

### Pigeon and parrot propagation

Breeding endangered and unusual species remains a high priority. More than 1,200 eggs were laid at the Zoo during the year, and more than 300 chicks hatched. While there were many chicks of significance, the two which required the most work and concern were the pink pigeon and the Pesquet's parrot. After several failures, a pink pigeon chick was reared by hand for the first time in North

America. This is an important step in helping to preserve a species that numbers less than sixty living specimens. The rare Pesquet's parrot from New Guinea has produced several chicks over the past few years but has never successfully reared one. This year, two chicks were removed soon after hatching. One died when only a few weeks old but the second was nursed through a critical period and hand-reared. The young bird reached full growth and feathered out in male plumage. In mid-June another chick hatched and was also removed for hand-rearing.

### Cranes and hornbills

Crane breeding efforts are becoming more significant with each passing year. During 1982, a total of forty-two cranes of seven species were hatched. The three endangered species selected for long-term propagation have all done extremely well, with white-naped cranes producing eleven chicks; hooded cranes, eight; and wattled cranes, eleven.

In 1983, three breeding pairs of both white-naped and hooded cranes were developed along with several younger pairs of unrelated birds. The wattled crane program now has two breeding pairs and potentially up to three additional pairs. Within a year or two, it is hoped that there will be five breeding pairs of each of these rare species.

The Malayan wreathed hornbills at the World of Birds have a chick again this year. Now, with recently acquired hornbills, it has been possible to pair all the young that have been reared here over the past five years. Several pairs at St. Catherine's



A South American king vulture chick was hatched on April 21.

Island are showing interest in nesting. The addition of new birds there has created four unrelated pairs of both Malayan wreathed and concave-casqued hornbills.

#### Staff activities

Dr. Bruning was reappointed secretary of the International Council for Bird Preservation's world parrot working group and as chairman of the American Association of Zoological Parks and Aquariums' legislative committee. He was elected to the Board of Directors of AAZPA to serve a three-year term. He also negotiated permits for several North American zoos to collect birds in Papua New Guinea. Permission has now been obtained which will allow a consortium of zoos to conduct salvage operations in areas of the country where mining and lumbering will destroy large tracts of forest.

Associate Curator Christine Sheppard continues to keep the international studbook for the white-naped crane. In November she led a tour through India on behalf of the Animal Research and Conservation Center.



Thirteen birds of paradise of seven species arrived at the World of Birds during the year.

#### Bird Census, Bronx Zoo (as of Dec. 31, 1982)

Order	Families	Species and subspecies	Specimens in Park	Specimens owned
Struthioniformes—Ostriches	1	1	3	3
Rheiformes—Rheas	1	1	4	4
Casuariiformes—Cassowaries, emu	2	2	6	5
Tinamiformes—Tinamous	1	2	10	10
Sphenisciformes—Penguins	1	1	11	9
Pelecaniformes—Pelicans, cormorants	2	3	16	16
Ciconiiformes—Hérons, storks, flamingos, etc.	5	16	74	78
Anseriformes—Swans, ducks, geese, screamers	9	55	226 ±	242
Falconiformes—Vultures, hawks, eagles	4	10	18	19
Galliformes—Quail, pheasant, etc.	4	23	198	209
Gruiformes—Hemipodes, cranes, rails, etc.	6	20	109	119
Charadriiformes—Plovers, gulls, etc.	9	24	128 ±	130
Columbiformes—Pigeons, doves	1	9	20	14
Psittaciformes—Parrots, etc.	1	14	26	32
Cuculiformes—Touracos	1	6	14	18
Strigiformes—Owls	2	8	18	19
Caprimulgiformes—Frogmouths	1	1	11	11
Apodiformes—Hummingbirds	1	3	4	4
Coliiformes—Colies	1	1	2	0
Trogoniformes—Quetzals	1	1	5	5
Coraciiformes—Kingfishers, hornbills, etc.	5	11	32	25
Piciformes—Barbets, toucans, woodpeckers	2	6	9	10
Passeriformes—Perching birds	28	87	267	283
<b>Totals</b>	<b>89</b>	<b>305</b>	<b>1,211 ±</b>	<b>1,265</b>

N.B. Specimens in Park include 47 on loan to the NYZS from other collections. Specimens owned include 105 on loan to other collections from the NYZS. There were 15 endangered species in the collection. Hatchings for 1982 totaled 371.

### Snakebite protocol

Throughout its eighty-four-year history, the Reptile House has been noted for its collection of venomous snakes. Working with these fascinating and potentially dangerous creatures, curators and keepers have established and maintained a tradition of safe handling methods that have helped to prevent serious mishap. Each year, snakebite emergency measures are thoroughly reviewed and improved.

Expertise in this area also enables the Herpetology Department to aid the community at large. In recent months, the Department has worked closely with the medical staff of the Bronx Municipal Hospital Corporation in developing a snakebite protocol for the entire metropolitan area. As a result, Jacobi Hospital has been designated the venomous reptile treatment center for New York City.

The protocol—endorsed by Emergency Medical Services of New York—has been distributed city-wide. All Jacobi Hospital emergency medical personnel are thoroughly briefed on the snakebite program by the Herpetology staff, who are responsible both for identifying poisonous reptiles in emergency cases and supplying the appropriate antivenins. The antivenins, which are funded by the United States Fish and Wildlife Service, are administered from the Reptile House after proper identification. During the year, four bites—two extremely dangerous—were successfully treated by the Jacobi Hospital snakebite team, with support from the Department staff.

### Breeding, acquisitions, and loans

Two Australian desert skinks, fifteen Indian rock pythons, and sixteen Jamaican boas (the latter two endangered species) were among the 246 hatchlings and births in the reptile collection, which also included second generation births of anacondas, Brazilian rainbow boas, and king cobras. The bog turtle reproduced for the tenth consecutive year, and Malagasy radiated tortoises produced another large group of young at the Wildlife Survival Center on St. Catherines Island, some of which will later be transferred to the Bronx.

Three broad-shelled snake-neck turtles were received as gifts from the Melbourne Zoo and four St. Hillar's turtles from the Buenos Aires Zoo. Three Malagasy ground boas came on breeding loan from the Fort Worth Zoo, and a group of chocolate brown and orange Taylor's cantils were acquired from the Houston and Gladys Porter zoos.

The most unusual acquisition was "Kensy," a well-publicized young American alligator, rescued from the Kensico Reservoir in Westchester County, which now enjoys celebrity status in the Children's Zoo.

Surplus young and rehabilitated public donations were sent to zoological parks in fourteen states and eleven countries around the world. "Jaws," the huge male false gavia that occupied the center crocodile pool, was sent to Metrozoo, Miami, on breeding loan.



Antivenins from throughout the world are stocked in the Reptile House for use in the citywide snakebite program.

#### Changes at the Reptile House

New exhibits were completed for prehensile-tailed skinks from the Solomon Islands, amphiuma (a giant eel-like salamander from the southeastern United States), and young Chinese alligators. The Riverbank exhibit was completely renovated and now features the unusual New Guinea Fly River Turtle. Behind-the-scenes changes included the re-flooring with quarry tiles of the north passage, where tours are often conducted and from which many exhibits are serviced. Significant improvements have also been made in the crocodile breeding facilities.

#### Staff activities

Bog Brook Unique area, a 132-acre state wildlife refuge in Putnam County, New York, remains a special interest of Curator John Behler. There he is studying the fidelity of turtles to certain hibernation sites and other aspects of chelonian life history. The curator works closely with the New York Department of Environmental Conservation on the management of herpetological resources at Bog Brook. In 1982, he served a second year as chairman of the Conservation Committee of the Society for the Study of Amphibians and Reptiles.

Superintendent Peter Brazaitis, as a member of the IUCN/SSC Crocodile Specialists Group, delivered papers on the trade in crocodile hides and products

to the group's Sixth Working Meeting, held in Victoria Falls, South Africa, in September 1982. He also continues to provide valuable assistance to the Fish and Wildlife Service by identifying endangered crocodilian products.



Rare Fly River turtles from New Guinea are featured in the renovated Riverbank exhibition.

#### Reptile and Amphibian Census, Bronx Zoo (as of Dec. 31, 1982)

	Families	Species and subspecies	Specimens in Park	Specimens owned
<b>Reptilia orders</b>				
Testudinata—Turtles	8	45	165	193
Crocodylia—Alligators, caimans, crocodiles	2	14	56	93
<b>Squamata</b>				
Sauria—Lizards	8	19	59	54
Serpentes—Snakes	8	66	318	313
<b>Totals</b>	<b>26</b>	<b>144</b>	<b>598</b>	<b>653</b>
<b>Amphibia orders</b>				
Caudata—Salamanders	2	6	15	15
Salientia—Frogs, toads	7	16	52	58
<b>Totals</b>	<b>9</b>	<b>22</b>	<b>67</b>	<b>73</b>

N.B. Specimens in Park include 93 on loan to the NYZS from other collections. Specimens owned include 129 on loan to other collections from the NYZS. There were 15 endangered species in the collection. Births and hatchings for 1982 totaled 246.



As habitat destruction and human encroachment continue to decimate the world's wildlife, breeding programs at the Wildlife Survival Center on St. Catherines Island in Georgia assume an increasing urgency. This was reflected during the past year in the addition of five new species, and in the birth or hatching of 140 young. Acquisition of additional specimens of nine species already in residence highlighted efforts to enhance the genetic diversity of the Center's collection and to implement long-range propagation strategies. Collaboration between St. Catherines Foundation staff and Survival Center staff was unusually intense and productive.

#### **Propagation and acquisition**

The mammal collection, realizing close to full reproductive potential, enjoyed a record sixty-eight births, including twelve dama gazelles, eight slender-horned gazelles, and five Grevy's zebras. The small Arabian oryx herd acquired last year produced two calves. This species, extinct in the wild since the late 1950s, survives only as the result of captive breeding. The births of two red-fronted and four white-fronted lemurs initiated the Center's propagation of this delightful but gravely endangered prosimian species from the Malagasy Republic.

It was possible to transfer forty-four specimens to other zoos in this country and abroad. As a result, the age structure and genetic profile of the addax, gemsbok, dama gazelle, and sable antelope herds have been brought in line with requirements for long-term captive propagation. Significant progress has been made in this direction for other species as well. The acquisition of a male and two female white-fronted wallabies from the National Zoological Park and a pair of white-fronted lemurs from the San Francisco Zoological Gardens will contribute essential genetic diversity to the Center's collection of these endangered species.

The endangered rhinoceros hornbill, a spectacular member of an unusual group which represents a major focus of the Center's propagation program, was among three species added to the bird collection. Thirty specimens of seven species already established on St. Catherines were also acquired. Notable among the record fifty-eight chicks hatched were twenty-three cranes representing six species, including the endangered wattled and paradise cranes. A Pesquet's parrot chick hatched on the island and hand-reared at the Bronx Zoo is only the second of this species bred in captivity.

The hatching of a Florida sandhill crane egg taken from wild parents in the Osceola National Wildlife Refuge in Florida marked the beginning of a pro-

gram to reintroduce this species to St. Catherines Island and eventually to other portions of its former range in coastal Georgia. Undertaken in cooperation with efforts by the United States Fish and Wildlife Service to establish resident populations of the critically endangered whooping crane in the Okefenokee and Osceola National Wildlife refuges, the program will utilize eggs taken from wild birds chosen as surrogate parents for whooping crane chicks.

Worldwide recognition has greeted propagation of the gravely endangered Malagasy radiated tortoise. Fourteen hatchlings reared during the past year reflect improvements in incubation techniques and



One of eight slender-horned gazelles born at the Wildlife Survival Center during the year is tagged by Associate Curator James Murtagh.

nutrition, as well as greater behavioral insight. The Aldabra tortoises, endangered natives of the Seychelles Islands, laid eggs for the first time at St. Catherine's. The twenty-three eggs recovered were expected to hatch in July 1983. Groups of the threatened South American red-footed and yellow-footed tortoises were added to the collection with every expectation of similar reproductive success.

#### Research projects

A continuing study of the reproductive physiology of the gemsbok conducted by the Society's Animal



Maleos from Celebes are among the twenty-one species of birds being bred at St. Catherine's Island.

Health Department should culminate next spring in an embryo transfer between females of this species, which will hopefully provide the groundwork for transfers between related species of antelope. Such techniques, already widely applied in domestic animal husbandry, could have profound implications for the preservation of endangered species.

A comparative study of the activity patterns and social behavior of Arabian oryx, addax, and sable antelope was undertaken by Gwen Murdock, a doctoral candidate from the Georgia Institute of Technology.

#### Staff activities and changes

John Iaderosa, formerly of the New York Zoological Park, was named staff Zoologist in February 1983. In addition to assisting the curatorial staff in managing the collection, he will operate the Center's veterinary laboratory and maintain specimen inventory records.

Selected for the summer intern program, now in its third year, were Kim Martin, a graduate in biology from Hiram College in Ohio, and John Simon, a graduate in wildlife ecology from Michigan State University. Both will assist in the care of the collection and, under supervision of the professional staff, will examine the genetic profiles of the Center's ungulate herds, as well as analyze data on the growth and development of psittacine, crassid, and crane chicks.

#### Wildlife Survival Center Census (as of Dec. 31, 1982)

Mammalia orders	Families	Species and subspecies	Specimens at Center	Specimens owned
Marsupialia—Wallabies	1	1	11	11
Primates—Lemurs	1	4	15	4
Perissodactyla—Zebras	1	1	10	9
Artiodactyla—Antelope	1	8	127	104
<b>Totals</b>	<b>4</b>	<b>14</b>	<b>163</b>	<b>128</b>
<b>Aves orders</b>				
Rheiformes—Rheas	1	1	6	6
Galliformes—Pheasants	2	3	13	10
Gruiformes—Cranes, bustards	2	6	37	31
Columbiformes—Pigeons	1	1	5	5
Psittaciformes—Parrots	1	7	29	26
Coraciiformes—Hornbills	1	3	10	7
<b>Totals</b>	<b>8</b>	<b>21</b>	<b>100</b>	<b>85</b>
<b>Reptilia orders</b>				
Testudinata—Tortoises	1	4	41	26

N.B. Specimens at Center include 69 on loan to the NYZS from other collections. Specimens owned include 6 on loan to other collections from the NYZS. There were 12 species in the collection listed as endangered. Births and hatchings for 1982 totaled 120.

### Hospital groundbreaking

Thanks to major funding from the City of New York and generous contributions by Society Trustees and others, construction was begun on the new animal hospital in early 1983. By June 30, the foundations had been laid and the major plumbing lines were being installed below the floor level.

Equipping the hospital was aided substantially by the New York City Health and Hospitals Corporation, which supplied x-ray equipment from one of its recently closed hospitals. With this equipment, procedures such as angiography to study heart disease can be performed and permanently recorded on videotape or film. A library of such videotapes, on food passage, bone development, and a host of other normal physiological functions, as well as abnormal or diseased conditions, will be invaluable both for diagnosis and for teaching zoological medicine. Laboratory machinery, incubators, and additional equipment obtained from other City hospitals will also enhance the new hospital's capacity as a clinical, research, and teaching center.

### Clinical studies

A total of 250 birds of sixty-three species have been sexed thus far through laparoscopy. This has facilitated the pairing of birds for breeding projects both at the Zoo and at the Wildlife Survival Center. The purchase of additional laparoscopy equipment will allow for even greater precision in the diagnosis of disease than is now possible by visual or biopsy techniques.

Research has continued on the role of vitamin E deficiencies as the cause of disease syndromes in various species, in particular, heart disease in nyala antelope, nerve degeneration in Mongolian wild horses, and muscle atrophy in numerous avian species. The Hoffmann-LaRoche Company participates in this project by performing all the laboratory tests, while the veterinary staff under Dr.

Emil Dolensek obtains samples, monitors the animals, and interprets the results. Currently, this project, which is in its third year, has described the disease state in many species. Quantifying the vitamin E levels necessary in food for various endangered species will be the aim of next year's study.

### Reproductive biology program

In August 1982, Wendy Westrom, V.M.D., joined the Reproductive Studies Unit under Dr. Janet Stover as Jessie Smith Noyes postdoctoral fellow in reproductive biology. Dr. Westrom's work is devoted to the development of a sperm bank and the study of normal reproductive physiology in zoo animals. In addition, she has begun to explore a promising new method of gene preservation which involves freezing immature oocytes (eggs) that have been collected postmortem from female animals. The ova can then, at a later date, be matured *in vitro* for fertilization. A third element is thus being added to the program's gene bank, which already contains sperm and embryos.

Dr. Lyndall Erb Meuli, Jessie Smith Noyes postdoctoral fellow in reproductive endocrinology, completed a two-year study of the dromedary camel. By testing the hormones of four females throughout the year, she was able to develop a more complete understanding of their reproductive cycles.

Following the successful embryo transfer from gaur to holstein and the birth of Manhar in 1981, the next step was to create a bank for frozen gaur embryos. While this is a common procedure now for domestic cattle, it had not been attempted for the gaur. In May 1983, however, Dr. Jim Evans of the University of Pennsylvania assisted in collecting twelve embryos from a female gaur at the Bronx Zoo. Eight of these were frozen in a programmable embryo freezer. If viable after thawing, the embryos will be transferred to holstein cows for possible gestation and birth.

With epoxy glue and electrical tape, Dr. Emil Dolensek repairs a young hornbill's beak.





The Zoological Society's 1895 mandate to "furnish instruction to the public" is now carried out by an education staff that includes curators, animal supervisors for the Children's Zoo, instructors, writers, an audio-visual technician, docents, volunteers, and administrative personnel. Their work involves not only curriculum planning and classroom teaching, but also the writing of interpretive exhibition graphics, the preparation of scripts for the Bengali Express and Safari Train guided tours, the publication of education materials, the operation of animal rides, animal presentations in the Wildlife and Children's theaters, the creation of audio-visual programs, and Friends of the Zoo tours and outreach programs. For visitors and the Society's larger audience, zoo education continues to take on an ever-broadening role.

#### Teaching teachers

Communication with New York City's education community have become part of that role, as witnessed by two new projects inaugurated in the past year. Starting with a citywide school superintendents' conference chaired by then Schools Chancellor Dr. Frank J. Macchiarola, the Education Department conducted a series of principals' conferences at the Zoo. To date, all principals from District #26 in Queens, #10 and #11 in the Bronx, and #31 in Staten Island have had an opportunity to see firsthand the wealth of educational opportunities available at the "New Bronx Zoo," through tours of new exhibition facilities and demonstrations of creative teaching techniques.

Addressing the needs of teachers, the IDSE program ("Information Dissemination Through Science Education"), funded by the National Science Foundation, made possible a series of six full-day training workshops on environmental education materials and methods. The purpose was to provide a focus that is often lacking among teachers, and to detail a variety of approaches for using the Zoo. Thirty science teachers from districts in the Bronx, Manhattan, Brooklyn, and Queens were shown how to make Zoo trips an integral part of their curriculums. The participants were then asked to conduct workshops for teachers in their own schools, thus multiplying the training effect manifold. The teacher workshops were accompanied by a program of forums for administrators and parents, to inform them about the goals of the Zoo and the IDSE program and to enable a closer contact with local communities.

#### WOW to ZIP

Project WOW—"Windows on Wildlife"—an environmental science program for grades three through six, began its fifth year with eighty-nine fee-paying

classes registered. This multiple-session program reached nearly 3,000 students, a thirty-four percent increase over the previous year.

"Animal Discovery," single sessions focusing on animal classes and adaptations, increased in enrollment by nearly sixty percent, with more than 3,500 children in 107 classes. This mini-science program, in addition to instruction, provides printed pre-, post-, and in-Zoo materials for the teacher. These materials were developed as part of ZIP—"Zoo Information Packs"—funded in 1981 by the William Randolph Hearst Foundation. Currently, any elementary level teacher can request these thematic packs free of charge. The last of the four theme units—"Adaptations"—will be available in time for fall-winter 1983 Zoo visits. The ZIP program will provide an educational service to nearly 250,000 students each year.

The total of all school group courses at the Zoo stood at a record 11,812 participants in 406 class sessions.



New camel barns were built near Wild Asia Plaza, where camel rides operated by the Education Department remain as popular as ever.



### General audience programs

An old favorite—"Winter Wildlife Adventures"—was brought back by popular demand. Youngsters took part in a circumpolar quest in this one-week program, which featured arctic survival games and focused on animals' adaptations to cold. An explorer's hunt, a simulated plane ride over the polar regions, and classes in Eskimo soap carving made this a most memorable winter experience.

Guest lectures, conducted by ARC Director George Schaller, Ornithology Curator Donald Bruning, Education Chairman Richard Lattis, and Exhibition and Graphic Arts Curator John Gwynne, led a full roster of seventeen courses for adults. Family learning was emphasized in a new series of "Close-Up" programs which enabled youngsters to join their parents in studying African, South American, and Asian animals. Individual participation in general audience programs totaled 2,176 in 198 course sessions.

### Curriculum projects

The Department continued its intensive development of "Wildlife Inquiry Through Zoo Education." Funded originally in 1981 by the National Science

Foundation, WIZE is the first federal grant program to use zoos as centers for science study and to create curriculum materials for a national school audience. The first color prototype of WIZE—"Diversity of Lifestyles"—was tested with over 2,500 students through participating zoos in Philadelphia, Topeka, and Columbia, South Carolina. Additional test sites in Kentucky, Texas, Michigan, and Ohio have begun to send in evaluation data for analysis, and work on the second module—"Survival Strategies"—is currently in progress. Requests for WIZE materials from thirty-five states and several countries abroad indicate the potential for national and worldwide distribution.

### The Children's Zoo

During the fiscal year, 545,252 children and adults enjoyed the scenic beauty and participatory activities in the challenging new Children's Zoo, which was popular not only with zoo visitors, but with zoo professionals as well. Many zoos and even some museums in the United States and abroad have either introduced similar concepts of exhibiting wild animals for children or adopted individual participatory exhibits, such as the spider web,



"Diversity of Lifestyles" is the first module of WIZE, the Society's innovative program of wildlife and conservation education for a national secondary school audience.

prairie dog tunnels, and turtle shells. At the 1982 American Association of Zoological Parks and Aquariums' annual meeting, the Bronx Children's Zoo was honored as the best new exhibit of the year.

Adjacent to the Children's Zoo, in the renovated old Zebra House, the Educational Services Building went into full operation in the fall. This new facility now handles most of the Education Department's classes at full capacity and houses the rotating animal population of the Children's Zoo.

The Department's presence in Wild Asia was expanded with the completion of a new barn for camels and llamas, as well as a camel exhibit. One of the main attractions for visitors was the baby camel, Zachary, born on March 24, 1983.

### Friends of the Zoo

The more than 200 dedicated volunteers comprising the Friends of the Zoo serve the Society by leading school group tours, providing interpretive services in the Children's Zoo, giving mini-tours of exhibits, and assisting with educational courses and the Society's special events. In addition, they answer hundreds of letters sent to the Zoo by schoolchildren.

A special committee of FOZ recently completed a slide show, called "Zoo Preview," which is offered to community groups, clubs, and corporations to promote visits to the Zoo. Last year, volunteers participated in sixteen membership birthday parties and gave 315 tours to over 10,000 children. The outreach program visited 2,166 people in medical institutions, bringing live animal demonstrations to those unable to visit the Zoo.

### Children's Zoo Census, Bronx Zoo (as of Dec. 31, 1982)

	Families	Species and subspecies	Specimens in Park	Specimens owned
<b>Mammalia orders</b>				
Marsupialia—Opossum	1	1	1	1
Edentata—Armadillos	1	1	1	1
Lagomorpha—Rabbits	1	2	17	17
Rodentia—Mice, porcupines, etc.	4	5	14	14
Carnivora—Foxes, ferrets	3	4	18	18
Perissodactyla—Horses	1	3	4	4
Artiodactyla—Goats, sheep, camels, etc.	2	5	22	21
<b>Totals</b>	<b>13</b>	<b>21</b>	<b>77</b>	<b>76</b>
<b>Aves orders</b>				
Ciconiiformes—Hérons	2	4	12	12
Anseriformes—Ducks, geese	4	5	30	30
Falconiformes—Falcones	1	1	2	2
Galliformes—Chickens	1	1	14	14
Strigiformes—Owls	2	4	6	6
Columbiformes—Doves	1	1	2	2
Psittaciformes—Parrots	1	4	4	4
<b>Totals</b>	<b>12</b>	<b>20</b>	<b>70</b>	<b>70</b>
<b>Reptilia orders</b>				
Testudinata—Turtles	3	7	21	21
Crocodylia—Alligators	1	1	2	2
Squamata				
Sauria—Lizards	4	6	23	23
Serpentes—Snakes	3	7	18	18
<b>Totals</b>	<b>11</b>	<b>21</b>	<b>64</b>	<b>64</b>
<b>Amphibia orders</b>				
Caudata—Salamanders	1	1	5	5
Salientia—Frogs, toads	2	2	9	9
<b>Totals</b>	<b>3</b>	<b>33</b>	<b>14</b>	<b>14</b>

### Jungle World

The exhibits for Jungle World, the Zoo's largest and most elaborate indoor display, are now more than half complete. Two dozen sculptors, painters, and other specialists from The Larson Company work closely with the Society's staff to convert steel, fiberglass, epoxy, and cement into natural outcroppings, eroded mudbanks held by water-worn roots, and giant forest trees festooned with mossy vines. Working high atop mobile scaffolding, landscape muralists have begun painting expansive panoramas to cover more than 16,000 square feet of wall space. A vast, living greenhouse, Jungle World will enclose interpretive galleries and three major habitats for tropical Asian animals: a palm-covered lava flow characteristic of island savannas, an upriver mangrove lagoon edged by bamboo groves, a lush lowland rain forest.

### Snow leopards

Preliminary plans for a new snow leopard survival station, to be built on a shady, wooded hillside near the polar bear exhibit, call for a complex of exhibition and breeding facilities. This project, supported by the Women's Committee, will enable the Zoo to maintain as many as eighteen of these endangered cats from the highlands of Central Asia. The visitor's path through the exhibition will meander between rocky outcrops, across a Nepalese bridge, and under vine-covered trellises, through a carefully-planned sequence of exhibits depicting three aspects of a snow leopard's life: as a solitary hunter, in a rocky alpine den, and in a family group. Interpretive graphics will stress both the snow leopard's precarious existence in the wild and the interzoo propagation program in which the Society is playing a major role.

### Exhibition improvements

Several projects have involved the use of new materials and techniques that may have wider application in the future. At the Reptile House, the Riverbank exhibition has been completely renovated, with special attention to soft underwater epoxy coatings to help prevent damage to the delicate shells of Fly River Turtles, new lighting cycles to encourage plant growth, and reflective mylar and mirrored surfaces to expand the illusion of space. In Wild Asia, steel and fiberglass castings of oak trunks designed to divert elephants from destroying the real trunks of old forest trees are being tested. Other modifications and improvements have been made by the exhibition staff at the Children's Zoo, the Sea Lion Pool, and the World of Birds.

### Graphic design and production

New banners, posters, special invitations, and interpretive signs heralded the Society's 1983 salute to recently-arrived birds of paradise. Graphics concerning the biology and behavior of giraffes, cheetahs, and South African ostriches were created for the outdoor exhibits of the Carter Giraffe Building. At the Great Ape House, new photographic portraits and individual biographies of the gorillas convey a sense of their personalities and social interaction. And nine panels explaining beluga behavior were installed at the Aquarium's renovated whale tank.

More than 600 in-house orders for graphic materials were completed during the year for the Society's various departments. These include posters, stationery, travel brochures, invitations, promotional materials, education worksheets, and Project ZIP, created by the Education Department to reinforce teachers' and students' field trips to the Zoo.

For the first time, the Graphics Division has extended its scope of responsibility beyond the Zoo, Aquarium, and Wildlife Survival Center. In June 1983, a series of panels was donated to the Belize Audubon Society on behalf of the Zoological Society's Animal Research and Conservation Center for installation on Half Moon Caye Reserve in the Caribbean.



Artists Joye Yule, Lillian Kennedy, and Nick Wilson work on the vast murals which will complete the illusion of dense tropical forest in Jungle World.

### **Animal facilities**

At Jungle World, the Komodo Island and mangrove swamp areas are virtually complete, the great buttress-root trees of the rain forest have been raised, and the vast panoramic mural is underway. The project, which will also include live plants and five interpretive galleries, is scheduled for completion in 1985.

On the other side of the Zoo, the new animal hospital has begun to take shape, with the footings and foundation walls now in place. The City's contractor should have the building, with its modern clinical, research, and teaching facilities, ready for operation in the late fall of 1984.

With the siting of the hospital near the Southern Boulevard gate, the Zoo's camels were given a new management and exhibition facility adjacent to Wild Asia Plaza and Jungle World. The building and yards also accommodate llamas and ponies, other animals used for rides in the Zoo.

Another revitalized area is the old panda exhibit, which was remodeled to house North America's first exhibition of pudu, the world's smallest deer. The project required a new interior for the management building and landscaping of the exhibit itself.

### **Improvements and renovations**

Work on existing structures included the completion of cleaning and waterproofing the Old Large Bird House, the Monkey House, and the Educational Services Building under a City contract, and the total replacement of the monumental African Plains entrance structure according to the original design of 1941. At Propagation I, near the World of Birds, new crane-rearing yards were constructed to accommodate the Ornithology Department's expanded captive-breeding program.

Increased attention is being focused on modernizing the Zoo's infrastructure. To reduce energy costs, new boilers and burners were installed in the Shops building, the East Elephant Walk comfort station, the animal hospital, and the Educational Services Building. A new boiler for the Lion House is being funded by the City. Heating and ventilation systems for the South American exhibition management facility will be completed by fall 1983. And the Heads and Horns Building will soon have new offices for the Public Affairs and Government Affairs staffs.

In order to record all the changes that have occurred at the Zoo over the past forty years, a comprehensive topographic survey has been undertaken which will also aid in future planning. Aerial maps were done in conjunction with a study to determine the feasibility of instituting a new system of cogeneration.

### **Horticulture Department**

Since 1898, one year before the Bronx Zoo opened, forestry and gardening have played an important role in maintaining the Zoological Park as a place where both animals and plants can be protected and appreciated. As ecological concerns and techniques of habitat exhibition have evolved, so has the need for a more scientific approach to the introduction and maintenance of plant life throughout the Zoo.

A new Horticulture Department has therefore been established. Under Curator Timothy Hohn, the Department operates much like the animal departments, acquiring, growing, and managing a wide range of floral species, especially tropical plants for indoor exhibitions, as well as trees and plants for the Park grounds and the outdoor habitats of temperate-zone animals.

For Jungle World, the Department has already collected an abundance of rare and unusual tropical plants, partly through the generosity of the New York Botanical Garden. A new greenhouse will be constructed to service this vast and lush exhibition. Elsewhere, extensive plantings have been completed in Wild Asia and the African Plains, and various herbaceous perennials such as hostas, ferns, and daylilies have been established at locations throughout the Zoo. The emphasis is not only on furthering the Park's native beauty and creating settings appropriate to exhibited animals, but also on making the botanical life of the Zoo more available and meaningful as an educational resource.



### Admissions, Parking, and Transportation

For the first time since 1973, attendance at the Bronx Zoo surpassed the 2,000,000 mark, with 2,032,807 visitors for the fiscal year, despite the rainiest spring in the recorded meteorological history of New York City. A substantial percentage of those admitted came in cars and school buses, 236,860 of which were accommodated in the Zoo's four parking fields. Attendance at the Aquarium totaled 460,132.

With a total of 924,275 riders, transportation within the Zoo provided significant income in addition to that derived from admissions. The narrated Bengali Express monorail tour through Wild Asia led with 367,586 riders; followed by the Skyfari, 364,110; and the Safari Tour Trains, 192,579.

The Group Sales Department booked 1,004 groups totaling 59,496 people, reflecting an increased interest in this program. Participants included many Scout, school, church, and company groups.

### Food and Souvenirs

Though capital expenses were kept to a minimum during the year, sales at the Zoo's twenty-one food-serving facilities and nine souvenir stands were greater than ever.

Some improvements were made, in addition to refinements in operating procedures. These included the first renovation of the seating area behind the Kiosk since its inception in 1974. Colorful new green and yellow canopies were installed, along with new tables and chairs for daily visitors as well as special occasions. In addition, all food services and souvenir operations throughout the Zoo have now been outfitted with electronic cash registers.

### Personnel

In 1982-83, the New York Zoological Society employed 885 people, with 390 of them on the full-time staffs of the Bronx Zoo, the New York Aquarium, the Osborn Laboratories of Marine Sciences, the Wildlife Survival Center, and the Animal Research and Conservation Center. Among these employees are curators, keepers, administrators, writers, editors, designers, photographers, maintainers, attendants, research scientists, fund-raisers, field zoologists, security personnel, gardeners, food servers, construction workers, and even an archivist.

The 485 seasonal workers were employed to help operate the Zoo and Aquarium from April through October. These were young New Yorkers, primarily from Brooklyn and the Bronx, where the Society remains the largest summer employer of youths, for positions ranging from ticket-taker and tour guide to food service worker.

The Society continues to participate in several employment programs, sponsored by educational, government, and corporate agencies, through which disadvantaged and handicapped individuals are offered a chance to enter the work force.

In January 1983, at the Bronx Zoo, the Personnel Department presented a program on "Human Resources and Management Studies" to administrators from various American zoos and aquariums. Personnel staff also participated in a comparable workshop for the cultural institutions of the Northeast hosted by the New York Botanical Garden.



An elephant's-eye view of the Bengali Express in Wild Asia.



## New York Aquarium

### A program of renewal

The New York Aquarium has begun to take on a new look as it enters its second twenty-five years in Brooklyn. Major conceptual exhibitions are being planned, capital projects have been approved, and a commitment has been made to enhance the Aquarium's role as a leading cultural, educational, conservation, and research facility.

Complete renovation of the 130,000-gallon beluga whale tank was the first step in this long-range program. New acrylic panels, up to thirty feet long for uninterrupted underwater viewing from the Main Exhibit Hall, have replaced the old row of small windows. The Aquarium's two beluga whales, Kathy and Newfy, can also be seen from the deck outside the cafeteria. Handsome new graphics relate interesting facts about white whales, and an underwater hydrophone allows visitors to listen to the array of sounds emitted by these "Canaries of the Sea." These improvements were made possible by funds from the City of New York.

Plans are currently underway for other major installations and improvements. A new whale and dolphin stadium, with both above-water and below-water viewing, will operate year-round and accommodate many more visitors interested in be-

havioral performances of cetaceans than does the present facility. Preliminary planning funds have been provided by the City.

Discovery Cove, an educational "exploratorium" designed to involve family groups in learning about the marine environment, is now in the architectural planning stage. And an environmental representation of a rocky coast line is being designed to incorporate the popular black-footed penguin and seal pools into a continuous exhibition complex that will include a new pool for sea otters.

Meanwhile, a complete remodeling of the Main Exhibit Hall lobby has already improved visitor circulation. The Hall also has two new exhibits: a collection of coral reef fishes from the Florida Keys, including Spanish hogfish, doctorfish, and tangs; and an invertebrate exhibit with twelve different varieties of soft and hard corals, colonial anemones, sponges, tube worms, and sea whips.

### Helping the homeless

In its first year, the Aquarium's Marine Mammal Holding Facility has more than fulfilled its function as a facility not only for the isolation and treatment of sick animals, but also for the accommodation of stranded animals.

Aquarium staff transfer two beluga whales into their renovated tank.





In August 1982, a sea turtle became entangled in marine nets at Sheepshead Bay. It was brought to the Aquarium, treated, tagged, and released. In the same month, two Pacific walrus pups, later named Denali and Nuka, were found abandoned in Prudhoe Bay, Alaska. They were placed in the Holding Facility for observation and treatment. Since their arrival, they have gained nearly 200 pounds each on a formula of ground fish, heavy cream, vitamins, minerals, and affection. They are now on exhibition on seal island and are the first Pacific walruses to be shown by the New York Aquarium in fifteen years.

On February 27, 1983, a female harbor seal was beached in the Rockaways. Aquarium staff were dispatched to the scene, along with Parks Department employees and New York City police officers who transported the animal to the Aquarium. Diagnosis showed the seal to be suffering from lung worms, trauma to the head, and a serious infection. Rocky, as she was named by local school-children, fought a winning battle to regain her health with the aid of the NYZS veterinary and Aquarium staffs. In May, now a media celebrity, Rocky was placed on exhibition with other harbor seals. It is hoped that upon regaining social and competitive feeding skills she can be released back into the ocean.

Two striped dolphins found stranded near Coney Island were less fortunate. Due to the advanced stages of their illnesses, both animals died soon after their arrival at the Aquarium. Information provided by the necropsies, however, may prove invaluable in the care of captive dolphins and other animals found stranded in the future.

The Holding Facility also proved useful as a temporary home for three bottle-nose dolphins on their way from Marineland of the Pacific to the new Aquarium in Tel Aviv. The dolphins spend a day at the Aquarium while waiting for their connecting flight.

#### **Aquarium Education**

For the first time, visitor responses are being used to help design a major exhibition complex, with family groups videotaped at various exhibitions around the Aquarium as part of the planning preparations for Discovery Cove. This will be the principal educational exhibition complex at the Aquarium, with areas devoted to coastal ecosystems, animal adaptations, and the relationship between human society and the sea. Plans for the facility, which emphasizes intergenerational learning, were reviewed by a conference of students and faculty from Columbia Teachers College, who also set up a family committee to consult on the project.

Aquarium admissions included 90,340 school-children in 2,581 groups, twenty percent of total attendance. The lecture and tour programs served 8,166 individuals in 255 groups, and guided tours were given to 6,650 students in 160 groups. In addition, summer and winter camps for both the elementary and secondary school levels were attended by a total of seventy-four students. The Education Department and the Con Edison Save Energy Club also sponsored a program to develop off-season attendance that attracted 1,285 students.

Thirty-two programs for families and students, from elementary school through college, were offered in the 1982-83 Education brochure. These ranged from in-depth beach investigations and behind-the-scenes Aquarium tours to classes in endangered marine species and visits to the Fulton Fish Market.



Breeding blue lobsters at the Osborn Labs may aid in the development of controlled lobster farming.



Docents are essential to the Aquarium as an educational resource, and last year seventy of them were recruited, trained, and employed to give lectures and answer questions at various locations. Graduate and undergraduate interns also train at the Aquarium, assisting in the Education program. Serving were students from Brandeis, Columbia,

Connecticut College, Florida Institute of Technology, John Jay, and Princeton. Two high school interns were part of the City as School and Training Opportunity Program run by the New York City Board of Education, and another intern, backed by Exxon, designed a new program for families and other summer audiences.

# New York Aquarium Census (as of Dec. 31, 1982)

Phylum	Class	Order	Species	Specimens
Chordata	Chondrichthyes—Cartilaginous fishes: Sharks, rays, chimeras	Heterodontiformes—Horn sharks	1	7
		Squaliformes—Typical sharks: Sand tigers, lemons	5	24
	Osteichthyes—Bony fishes	Rajiformes—Rays	2	7
		Acipenseriformes—Sturgeon, paddlefish	2	52
		Amiiformes—Bowfin	1	7
		Elopiformes—Tarpon, bonefish	1	2
		Anguilliformes—Eels, morays	7	16
		Salmoniformes—Trouts	3	24
		Cypriniformes—Minnows, carp	5	200
		Siluriformes—Freshwater catfishes	3	56
		Batrachoidiformes—Toadfishes	1	22
		Gadiformes—Codfishes	2	2
		Atheriniformes—Platys, swordtails, killifish	30	380
		Beryciformes—Squirrelfishes	2	30
		Gasterosteiformes—Seahorses, pipefish	2	9
		Perciformes—Perches, sea basses, porgies, cichlids	150	700
		Pleuronectiformes—Flatfishes	5	25
		Tetraodontiformes—Puffers, boxfish, triggerfish	8	30
		Family: Protopteridae—African lungfish	1	1
	Reptilia	Chelonia—Turtles	6	30
	Aves	Sphenisciformes—Penguins	1	42
	Mammalia	Pinnipedia—Seals, sea lions	4	12
		Cetacea—Whales, dolphins	2	3
Cnidaria	Anthozoa—Corals, anemones		25	18,000 ±
Annelida	Polychaeta—Marine worms		3	20
Arthropoda	Crustacea—Lobsters, shrimps, crabs, isopods		11	114
		Arachnida—Horseshoe crabs	1	50
Mollusca	Gastropoda—Snails		1	100
	Pelecypoda—Bi-valves		2	14
	Cephalopoda—Octopus, nautilus		3	15
Echino-dermata	Asteroidea—Starfish		9	60
	Holothuroidea—Sea cucumbers		3	15
	Echinoidea—Sea urchins		3	200
Totals			305	20,269 ±

### Blue lobsters and other crustaceans

New projects conducted by the Osborn Labs' multi-disciplinary team of investigators included the genetic and mariculture research of Dr. Anthony D'Agostino on blue lobsters. These rare animals result from genetic mutation and are estimated to occur in nature only once in every 3,000,000 to 30,000,000 lobsters.

The purebred blue lobsters which have survived into adulthood at the Osborn Labs are expected to contribute to the establishment of a brood stock of lobsters genetically tailored for captive rearing. D'Agostino's preliminary research indicates that some strains born of one particular mating are hardier and grow faster than either hybrid control groups or wild brown lobsters, traits that make them particularly desirable for trials in captive rearing.

For several years, Dr. Betty Borowsky has been working with gammarid amphipods, tiny crustaceans whose tube-building activities result in the fouling of ship hulls as well as the Aquarium's cold-water emission pipes. Her recent studies have led to some interesting discoveries about the animals' uses of their large and small claws, the differences in parental care between two closely related species, and the action of a chemical pheromone that is given off by females of the species *Microdiutopus gryllotalpa* in connection with mating.

### Chambered nautilus and Moses sole

Dr. John Chamberlain, Jr.'s research on the biology and natural history of the chambered nautilus has corrected some inaccuracies concerning the growth rate of these ancient shellfish and the structural properties which allow them to live at great depths in the ocean. In an eighteen-month study involving weekly x-ray analyses of growing juvenile animals, Chamberlain found that new chambers are added at a rate of about one every three months rather than one per lunar month, as had been previously believed, although there is considerable individual variation which appears to be related to food intake and the need to repair shell damage. These results indicate that the nautilus may live as long as twelve to fifteen years, far longer than squids and other soft-bodied cephalopods to which they are related. Chamberlain's work has also refuted some currently favored hypotheses concerning the sources of structural strength in shelled cephalopods, proving that the geometry of the siphuncular tube wall and septal curvature are not decisive factors in determining strength.

Drs. Naftali Primor and Joseph F. Gennaro have begun a joint investigation of the morphology of the venom gland of the Moses sole. This Red Sea flat fish emits a toxin into the surrounding water, when attacked, that causes paralysis in the jaws of

sharks. Through experimentation it was discovered that the shark's gills were the target organs of this toxin. It is hoped that these studies will lead to the development of an effective shark repellent.

### Fish genetics

In an experimental stock of platyfish, Dr. Klaus Kallman has discovered that individuals with the XY or YY genotypes, normally males, will become females in the presence of a rare autosomal gene. It is believed that this gene fails to activate the sex-determining gene on the Y chromosome. A related study determined the frequency of such autosomal genes in nature. Autosomal genes that cause XY and YY fish to become females are relatively common in the Belize population of platyfish but are absent elsewhere. Conversely, autosomal genes that cause XX individuals to become functional males were detected in the Rio Choy population of pygmy swordtails.

The evolutionary significance of these autosomal genes is still poorly understood, although there are some interesting consequences in the pygmy swordtail. Because the X chromosome carries a gene for early maturation at a small size and the Y chromosome a gene for late maturation at a large size, the exceptional XX males are significantly smaller and mature earlier than the XY males.

### Pathology

With the acquisition of such new equipment as an atomic absorption spectrophotometer, a refractometer, and a dissolved oxygen meter, the pathology lab can now analyze the content of heavy metals in seawater, some of which are toxic to marine life. Automated and simplified procedures for monitoring salinity, dissolved oxygen, and pH enhance the maintenance of high water quality, which is so vital to the health of the Aquarium's animal collections.

Among the several fungi and parasites identified this year was an organism previously unknown to scientists. This parasitic worm, found on the Aquarium's lemon sharks, was named *Dermophthirius nigrellii* after OLMS founding Director Dr. Ross Nigrelli. A treatment to eradicate the parasite was also developed.

### Electron microscopy

Scientists from New York University's Department of Medicine, Rockefeller University's Cell Biology group, Fordham University's Biology Department, and Boston University all did work with the OLMS electron microscope during the year. In addition, OLMS and New York University offered a course in advanced electron microscopy techniques that was attended by accomplished microscopists from Fordham University, New York University, and Brookhaven National Laboratories.

There has been steady progress toward the creation of a unique network of zoos for New York City, designed and operated by the New York Zoological Society. The three City Zoos—in Central Park, Prospect Park, and Flushing Meadows Park—will have separate themes of wildlife exhibition, each offering an entirely different learning opportunity and an educational curriculum appropriate to that particular experience.

### Central Park Zoo

Completely new habitat exhibitions will offer the visitor a chance to compare and contrast the tropical, temperate, and polar ecological zones. Polar bears, primates, and other old favorites will again be exhibited in Manhattan but will be joined by other mammals, birds, reptiles, amphibians, and invertebrates in a series of colorful, educational, and humane environments.

Renovation of the Zoo began in November with the removal of the first animals from their old barred cages to zoos and parks that could more suitably house them, some as far away as Spain. Most went with little fanfare. Others, such as Skandy the polar bear and Tina the elephant, drew a great deal of attention from the press and the concerned public. Skandy now lives at the more

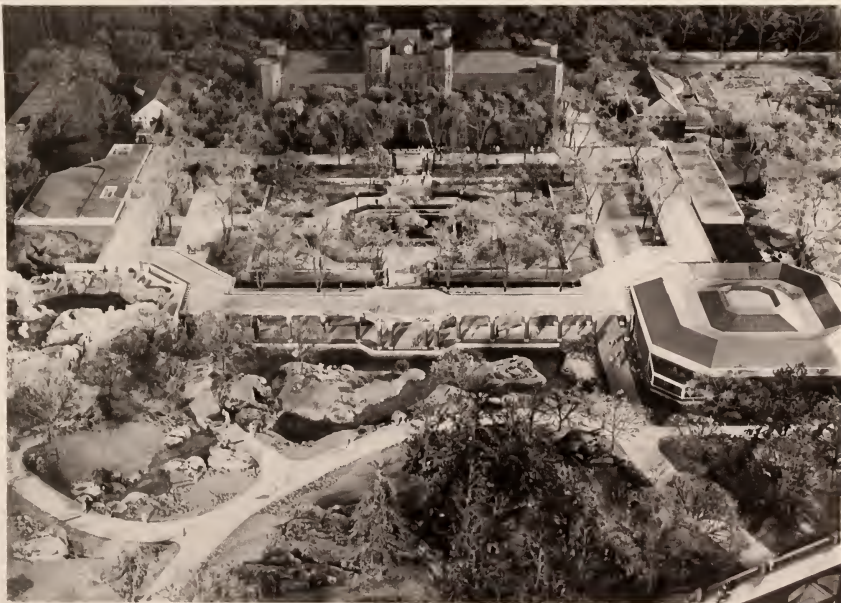
spacious Bronx Zoo, as do the gorillas Congo, Lulu, Caroline, and Patticake. Tina, despite reports of her disagreeable temperament, traveled with ease to California and is now living happily in the company of other elephants.

### Prospect Park

Schematic planning is about half complete for an exciting 8.8-acre Children's Zoo that will have both wild and domestic animals in exhibitions using tested classroom methods developed by the Education Department in concert with the New York City school system. The adaptive re-use of the three major animal exhibition buildings will introduce three new themes: "The World of Animals," "Animal Lifestyles," and "Animals in Our Lives." One of the existing concession and restroom buildings will be modified to house classrooms for educational programs, a feature now absent from the Zoo.

### Flushing Meadows Park

Renovation plans and schematic drawings for this 10.5-acre zoo are at the same stage as those for Prospect Park. While continuing to show mostly North American animals, the exhibitions, including the Children's Zoo, will be made more aesthetically pleasing to the visitor and more natural and spacious for the animals.



In a garden setting, a new Central Park Zoo will feature habitat exhibitions for polar, temperate, and tropical zone animals.







It was a year of contrasts for the Animal Research and Conservation Center, reflecting both the extraordinary variations of this planet's life forms and the enormous range of methods required to preserve them. On the one hand, ARC Director Dr. George Schaller returned to China to resume research on the giant panda in the second season of the most arresting endangered species study in the world today. On the other, a conscientious ranch woman presented ARC associate Dr. George Baxter with a single specimen of a Wyoming toad, thus verifying, after two years of uncertainty, the continued existence of this rare, obscure amphibian. In East Africa, ARC Resource Ecologist Dr. David Western assumed the chairmanship of the African Elephant and Rhino Specialist Group, thus adding new fire to ARC's longstanding commitment to the survival of these giants. Meanwhile, in Durango, Mexico, ARC associate Dr. Robert Rush Miller discovered an entirely new species of pupfish—an animal three inches long—and did so while securing the survival outlook of a second, but previously known species.

Regardless of the method, or the stature of the animal involved, species must be saved, and increasingly this means preserving the habitats in which they live. It is to these ends that ARC is committed, and the past twelve months of effort illustrate the breadth of that commitment, not only in the activities of ARC's staff research zoologists, described below, but also in a host of other field projects around the globe sponsored by the Society.

### Giant Panda Project

As principal investigator for this World Wildlife Fund, International initiative, George Schaller rejoined his Chinese co-workers at the Wolong Reserve in March 1983.

Of major concern was the mass-flowering and die-off of one bamboo species in the Wolong and other central parts of the panda's range, an event that occurs every fifty or more years. Because pandas depend entirely on bamboo for food, the die-off may effect their survival in these areas. It is hoped that an emergency plan developed by the research team might help to prevent the starvation that could threaten some populations.

Observations of pandas in the wild were highlighted by a dramatic encounter between an estrous female and five eagerly attending males. Pandas being rather secretive, solitary animals, this rarely-seen convocation has provided new insights into reproductive behavior.

Pandas were also surveyed in several areas outside of Wolong, enabling researchers to become more familiar with panda ecology in various parts of the animal's range. It is now possible to compare the new natural history data gathered in these surveys with data collected at Wolong.

### The greater Caribbean basin

The barrier reef along the coast of Belize in Central America is the finest and largest tropical coral reef in the western hemisphere. In the effort to protect this enormous, complex, and economically vital ecosystem, Dr. Archie Carr, III, Assistant Director of ARC, has continued to devise and promote a comprehensive conservation plan for Belize—and there has been progress on several fronts. Most notable is the heightened awareness and conscientiousness of the country's leadership concerning the extraordinary value of the great reef.

In addition, two international initiatives, encouraged by Carr and his associates in Belize, have been undertaken at the invitation of the Belize government. One involves the new Conservation for Development Center of the International Union for the Conservation of Nature (IUCN), which is preparing a National Conservation Strategy for Belize. The Strategy will establish environmental guidelines designed to prevent desirable economic growth from wrecking natural resources.

Stimulated by the IUCN interest in Belize, the United States government's Agency for International Development (AID) has begun research for what is called a Phase II Environmental Profile of the country. The Profile will tie in closely with the Conservation Strategy but will also have official impact on outside developers, permitting AID to discourage development proposals that are potentially damaging to the barrier reef as well as other areas in the country.

Contributing to both these international conservation assistance programs is a recently printed report, *The Belize Barrier Reef: An Assessment of Its Resources, Conservation Status and Management*, by Judith Perkins. Conceived by Dr. Carr, research for the 215-page reference document was sponsored by the New York Zoological Society and the Richard King Mellon Foundation through the Yale School of Forestry Internship Program. The report will be used to help design ARC marine conservation programs in Belize during the coming year.

#### **Uganda forest conservation**

The fate of tropical forests continues to dominate the attention of ARC Research Zoologist Dr. Thomas Struhsaker. From his field station in the Kibale Forest of Uganda, where for more than fifteen years he has monitored the diverse primate population, Struhsaker has been influential not only in saving the forest but also in establishing government-supported programs of conservation education and reforestation. Under his direction, a small team of experts has introduced new methods of surveying and monitoring habitats and wildlife in Uganda. Dr. Karl Van Orsdol has used satellite photography to document illegal human occupation of the protected Kibale Forest, and the information has led to the eviction of squatters by the

government. Van Orsdol is now working in a second forest, the Semliki, where similar encroachment is threatening the reserve.

#### **East Africa**

With the appointment of ARC Resource Ecologist Dr. David Western as Chairman of the IUCN's African Elephant and Rhino Specialist Group, the gigantic task of managing these huge beasts properly, reflected not only in the size of the animals but also in their wide sub-Saharan range, has now been unified under new leadership. Western's chief tasks are to coordinate the many elephant and rhino projects around Africa and to further develop a coherent conservation and funding program.



Dale Lewis, ARC Research Fellow, radio-tracks the movements of more than thirty elephants as part of his resource planning and management project in the Luangwa Valley, Zambia.

#### ARC Forum and The Ferret

In response to growing interest in the Society's conservation activities and in search of further support for its more than fifty international projects, two new projects were launched by ARC's Bronx Zoo headquarters during the year. ARC Forum presented a series of lectures at the Harvard University Club by distinguished scientists and leaders in the conservation community. Speakers included Dr. Archie Carr on the Belize barrier reef, Drs. Amy Vedder and William Weber on the mountain gorillas of Rwanda, and Dr. Timothy Clark on efforts to save the newly rediscovered black-footed ferret in Wyoming.

The ferret find also inspired the name for ARC's new quarterly newsletter, *The Ferret*, which has already reached an audience of 4,500 supporters for each of its first two numbers. The four-page publication, reporting on ARC's worldwide activities, has featured articles on the ferrets, elephant and rhino recovery in Africa; jaguars, and other cats in Manu National Park, Peru; minke whale research; and George Schaller's study of the giant panda.

#### Travel Department

The Society's travel program for members, about to enter its tenth year of operations, has over the years become increasingly associated with the work of ARC projects around the world. Recognizing this close relationship, the Travel Department has now been made a division of ARC, through the leadership of Dr. Donald Bruning and under the management of Andrew Robertson and Iris Freed. The growing market in specialized tours sponsored by cultural and scientific institutions offers opportunities to enhance education, publicity, and fundraising, as well as service to membership.

In the last twelve months, 368 members, accompanied by eighteen curators, keepers, and other Society staff, traveled on fifteen tours ranging from weekend whale-watching off Cape Cod to visiting the zoological parks of Britain and exploring Botswana's Okavango Delta. While in the field, tour members met and talked with David Western, Cynthia Moss, Shirley Strum, Cindy Hypki, Bernard Peyton, Keith Lindsay, Richard Lamprey, and many other ARC scientists whose work their contributions help to support.



Only fifty-nine black-footed ferrets have been counted in the course of ARC Research Fellow Tim Clark's Wyoming field studies of this rare mammal, until recently thought extinct.

**Africa**

- 1 Environmental education James Connor  
*East Africa*
- 2 Ecology of the mountain nyala and Bale Mountain National Park Chris Hillman  
*Ethiopia*
- 3 Zoological monitoring in Amboseli National Park David Western  
*Kenya*
- 4 Support for African Elephant and Rhino Specialist Group (AERSC) David Western & R. C. Malpas  
*Kenya*
- 5 Capital improvements in Amboseli National Park Government of  
*Kenya*
- 6 Elephant social behavior in Amboseli National Park Cynthia Moss  
*Kenya*
- 7 Crop-raiding in a population of olive baboons Shirley Strum  
*Kenya*
- 8 Impact of Maasai pastoralism on vegetation of the Mara region Richard Lamprey  
*Kenya*
- 9 Ecology and conservation Amy Vedder & William Weber  
*Rwanda*
- 10 Cape vulture study Joan Clare Dobbs  
*South Africa*
- 11 Ecology of the migratory white-eared kob in the Boma region John Fryxell & A. R. E. Sinclair  
*Sudan*
- 12 Education through the African Wildlife Leadership Foundation Sandra Price  
*Sudan*
- 13 Monitoring the Serengeti wildebeest population A. R. E. Sinclair  
*Tanzania*
- 14 The Kibale Forest Project Thomas Struhsaker  
*Uganda*
- 15 Human encroachment in forest reserves Karl G. Von Orsdol  
*Uganda*
- 16 Forest surveys Thomas Butynski  
*Uganda*
- 17 Elephant management in Luangwa Valley Dale M. Lewis  
*Zambia*

**Asia and Oceania**

- 18 Status survey of freshwater turtles in northeast Asia Edward O. Moll & Romulus Whitaker  
*India*
- 19 Establishment of provincial park at Uluaburi for birds of paradise David & Gillian Gillison  
*Papua New Guinea*
- 20 Behavior and ecology of montane birds of paradise and Macgregor's bowerbird Melinda & Stephen Pruett-Jones  
*Papua New Guinea*
- 21 Giant Panda Project George B. Schaller  
*People's Republic of China*
- 22 Gray's monitor lizard Walter Auffenberg  
*The Philippines*
- 23 Ecological factors affecting the black shama's decline Perla Magalay  
*The Philippines*

- 24 Conservation education R. Rudran  
*Sri Lanka* & *Indonesia*
- 25 Biological needs of hornbills at Kao Iai National Park Pilai Poonswad  
*Thailand*
- 26 Ecology of macaques and other wildlife in Huai Khaeng Sanctuary Ardith Eudey  
*Thailand*
- 27 Kitti's bat survey Merlin Tuttle & Surapon Duangkhae  
*Thailand*
- 28 Seabird conservation, Hawaii Jonathan R. Reed & Jack P. Hailman  
*USA*
- 29 Humpback whale studies, Hawaii Deborah Glockner-Ferrari & Mark Ferrari  
*USA*

**Central America and the Caribbean**

- 30 Island conservation and the Bahamian hutia Garrett Clough  
*The Bahamas*
- 31 The Cat Island turtle Perran Ross  
*The Bahamas*







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|--|--|--|---|--|---|
| 32 Comprehensive planning  | Archie Carr, III<br><i>Belize</i>      | 42 Red-bellied turtle conservation in Massachusetts    | Terry Graham<br><i>USA</i>                        | 51 Humboldt penguins                                     | Coppelia Hays & Donald Bruning<br><i>Peru</i> |
| 33 Coral Barrier Reef conservation   | Archie Carr, III<br><i>Belize</i>      | 43 Minke whales off the San Juan Islands, Washington   | Eleanor Dorsey<br><i>USA</i>                      | 52 Spectacled bear                                       | Bernard Peyton<br><i>Peru</i>                 |
| 34 Jaguar survey   | Alan Rabinowitz<br><i>Belize</i>       |  |   | 53 Predator-prey relations in neotropical forest mammals | John Terborgh<br><i>Peru</i>                  |
| 35 Interpretation and environmental education, Costa Rican National Park Service | Mario Boza<br><i>Costa Rica</i>        | <b>South America</b>                                   |   | 54 South American fur seal                               | Patricia Majluf<br><i>Peru</i>                |
| 36 Ecology and conservation of the tapir   | Keith D. Williams<br><i>Costa Rica</i> | 44 Interpretation training for national park wardens   | Gregory Kroll & Arturo Tarak<br><i>Argentina</i>  | 55 Ecology of Amazon parrots                             | Charles Munn<br><i>Peru</i>                   |
| 37 American crocodile study  | John B. Thorbjarnarson<br><i>Haiti</i> | 45 Lago Pozuelos National Monument                     | Arturo Tarak & William Conway<br><i>Argentina</i> | 56 The hoatzin   | Stuart Strahl<br><i>Venezuela</i>             |
| 38 Mezquital pupfish recovery plan   | Robert R. Miller<br><i>Mexico</i>      | 46 The magellanic penguin at Punta Tombo               | Dee Boersma & William Conway<br><i>Argentina</i>  |  |   |
| <b>North America</b>   |  | 47 Priorities for conservation in the Andean altiplano | Gregor Wolf<br><i>Argentina</i>                   |  |   |
| 39 The cahow and other endangered fauna  | David Wingate<br><i>Bermuda</i>        | 48 Jaguars of the Pantanal                             | Howard Quigley<br><i>Brazil</i>                   |  |   |
| 40 Black-footed ferret, Wyoming  | Tim W. Clark<br><i>USA</i>             | 49 Pudu and huemul in the Andes                        | Mark C. MacNamara<br><i>Chile &amp; Argentina</i> |  |   |
| 41 Wyoming toad recovery   | George Baxter<br><i>USA</i>            | 50 Primates of the Apaporis River Basin                | Thomas Defler<br><i>Colombia</i>                  |  |   |



The growing involvement of members, donors, and the public at large in the Society's programs is reflected in the coordinated activities of the Public Affairs Department. Capital and budgetary fund-raising, membership development and service, special events, and media contact with the public help to create both monetary and participatory support, complementing the vital contributions of Visitor Services, at the Zoo and Aquarium, and government agencies.

### Capital funds

The Animal Kingdom Campaign, chaired successively by George F. Baker III and John N. Irwin II, came to a successful conclusion on December 31, 1982. With contributions of \$3,667,866 in the final six months of the campaign, including the outstanding gift of Mrs. James Walter Carter, the goal of \$20,000,000 was exceeded by \$484,000.

During the course of the campaign, 283 gifts were received from 184 individual, foundation, corporate, and government donors. Led by six gifts of \$1,000,000 and over and forty-three of \$100,000 and over, the campaign added significantly to the Society's endowment funds and made possible a number of major projects and improvements at the Zoo and Aquarium.

Since the completion of the Animal Kingdom Campaign, capital fund-raising efforts have continued, directed primarily to the completion of funding for the renovation of the Central Park Zoo and the construction of the new animal hospital at the Bronx Zoo. By June 30, a special direct-mail solicitation for the animal hospital had resulted in total contributions of nearly \$150,000 from 1,400 donors. It is expected that funding for this project will be complete before the end of 1983.

Currently, capital fund-raising needs are being studied to determine priorities over the next five years for the Bronx Zoo, the New York Aquarium, and the Central Park Zoo, as well as certain endowment projects and the Society's international program of conservation.

### Budgetary funds

During fiscal year 1983, the Society received \$2,436,000 in contributions for current budgetary purposes. The efforts of the Society's volunteer committees were vital in obtaining this support. Under the leadership of the Development Committee, staff worked with several committees to generate \$912,000 in gifts from individuals; \$880,000

from private foundations; \$509,000 from corporations; \$135,000 in net proceeds from fund-raising benefits. An additional \$162,000 was received in bequests.

The Annual Patrons campaign, begun last year by co-chairmen John Chancellor and John Pierrepont, grew this year to 202 members contributing \$1,000 each, an increase of twenty-three percent. The Friends of ARC, under co-chairmen Mrs. Edgar M. Cullman and Douglas Kreeger, grew this year to fifty-five members, each subscribed at \$2,500. Altogether, about 40,000 individuals gave to the Zoological Society in fiscal 1983.

The Business Committee, newly co-chaired by trustees Arthur Hauspurg and Peter C.R. Huang, generated gifts from 200 corporate donors, while 150 private foundations, forty-seven of them new contributors, supported Society programs.

The Development Office operated sixty-four briefing sessions, social events, and fund-raising benefits during the year. Of particular note was the "Night of the Snow Leopard" benefit held by the Women's Committee on June 8 at the Bronx Zoo. The event, attended by 850 guests, produced more than \$200,000 on the Committee's pledge toward the construction of a new exhibition and breeding facility for the Society's collection of snow leopards, a rare and threatened species from the mountain regions of Central Asia.

With the help of a new full-time development and public relations specialist, the Aquarium and Osborn Laboratories Planning Committee raised \$195,000 in support of these facilities from all sources. This represents an increase of seventeen percent over giving in fiscal 1982.

Reflecting the Society's profound commitment to international conservation efforts, the Animal Research and Conservation Center development program was re-organized into a separate Public Affairs division. Recruitment is now being conducted to fill two new ARC development staff positions.

### Membership

The fiscal year ended with membership enrollment at an all-time high of 26,100. Membership revenues reached \$862,000. Particularly gratifying was the increased support over the previous year in the Family and Sustaining categories (up twenty-seven and twenty-one percent, respectively).



The steady growth of membership was, in part, attributable to a very successful direct-mail campaign which resulted in more than 4,500 enrollments. On-the-premises membership sales were an important factor, as well.

Participation in the Society's program of membership events also increased, with attendance at the Wild Asia Clean-up, Members Evening, Garden Party, and Annual Meeting attaining a combined total of 16,600 members and their guests.

#### **Public Relations, Advertising, and Special Events**

The continuing story of the Zoological Society's diverse programs, exhibitions, scientific work, and special events was brought to the public's attention in a variety of ways during the year. Extensive national news coverage included stories in *TIME*, *Newsweek*, *LIFE*, *GEO*, *The New Yorker*, and *The Wall St. Journal*. On television, Society activities were broadcast on the "CBS Morning News," the Cable News Network system, and numerous evening network news programs. Local news media regularly covered animal births, special events, and exhibition openings at the Zoo and Aquarium. Most importantly, the Society's curatorial staff continued to serve as a primary source of zoological expertise for local, national, and international media.

A combination of print, radio, television, and outdoor advertising helped to reinforce the Zoo and Aquarium audience development programs. New footage shot at the Zoo enabled the staff to produce a series of exciting television commercials highlighting the Children's Zoo and Wild Asia.

The Public Relations staff implemented a program to establish the Society as a rich programming source for network and cable television. Overseas film companies such as the British Broadcasting Company of Great Britain and Fuji Television of Japan filmed at the Zoo. Negotiations continued with the National Geographic Society toward developing an alliance with other non-profit institutions to create an independent cable television network.

The year's Zoo Celebrations included Wild Weekend in July, Elephants Galore in August, Halloween Happening in October, the Third Annual Great Egg Event in April, and Wings Weekend in June. These large-scale participatory events afforded family visitors unique educational and entertainment experiences, ranging from becoming a bird for a day to learning how a snake eats. Zoo Celebrations are now well known around the country and eagerly anticipated by the public and media of metropolitan New York.



Friends of the Zoo volunteers were on hand for animal demonstrations at the Society's 1983 annual meeting in Lincoln Center.



### New directions for *Animal Kingdom*

Now participating in and receiving *Animal Kingdom* magazine, are thirty-five zoological societies, a new peak representing approximately one-third of all the zoos in the United States. As circulation has expanded the staff has ventured into other heretofore unexplored aspects of the magazine publishing business.

After eighty-six years *Animal Kingdom* carried its first paid advertisements in the April/May 1983 issue. Ultimately, advertising sales should bring the magazine closer to its goal of becoming a self-sustaining operation. Sales are handled primarily by a publisher's representative who serves on a commission basis.

Single-copy sales, through a national distributor, showed equal promise. The number of copies distributed to bookstores and newsstands more than doubled in less than a year. Publishing experts confirm that this is an excellent performance for a magazine new to the market. Single-copy distribution also has begun to produce a significant number of new subscription orders through promotional inserts in the magazine.

Editorially, *Animal Kingdom* expanded its scope considerably. While field biology and zoo and aquarium stories remain the heart of the magazine, its broadened format includes animal-related articles in such areas as anthropology, botany, psychology, medicine, and domestic animals. The magazine also added a diverse group of new departments appearing on a regular basis: nature essays by Dr. Archie Carr; a series on evolution and paleontology by John C. McLoughlin; columns on zoo and aquarium medicine; reviews of natural history films and television shows; and wild-creature caricatures by British artist Ronald Searle.

### Awards

The magazine's high quality was recognized by the Society of National Association Publications (SNAP), which conferred on *Animal Kingdom* one of its three Grand Awards for "Distinguished Editorial Achievement" in the "Best Single Article" category. The winner was the investigative report "The Vicuna—Victor or Victim" which appeared in the June/July 1982 issue. SNAP also gave *Animal Kingdom* a Silver Award for "General Excellence Among Magazines with Circulation Over 30,000." Shortly after, the Society of Publication Designers awarded a Certificate of Merit for one of the 1982 covers. Earlier in the year *Animal Kingdom* was a National Magazine Awards Finalist in the category of "General Excellence Among Magazines with Circulation of 100,000–400,000."

### Photographic Services

The demand for support from Photographic Services continued to grow as virtually every other department in the Society called upon the photographers for documentation. The largest single undertaking was a journey to the Wildlife Survival Center at St. Catherines Island to shoot motion-picture footage for the Society's 1984 Annual Meeting and both color and black-and-white stills for use in a brochure, the annual report, slide shows, and *Animal Kingdom* magazine. Other photographic projects served a new Bronx Zoo advertising campaign, fund-raising proposals, graphics for the gorilla exhibit, documentation of construction procedures in Jungle World, an ARC report on rhino horn products, the Education Department's Project WIZE, the New York regional insert for *Animal Kingdom*, and this annual report.



Associate Curator William Meng's coverage of the Society's Wildlife Survival Center in Georgia included this shot of a black lemur.

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While management continued its efforts to curtail the rate of growth of expenditure items whose cumulative effect tends to hamper the Society's ability to operate on a breakeven basis, the deficit rose somewhat during fiscal 1983 to \$219,189, as general operating costs increased to \$21,839,643, 7.2 percent more than last year. Capital project expenditures were \$4,052,446, an increase of 43.3 percent, reflecting the heightened level of activity described in this report.

Contributions and fund-raising events provided 12 percent of general operating support. The Animal Kingdom Campaign surpassed its \$20 million goal, with \$3,667,866 being raised during the year. The successful completion of this campaign has increased endowment and funded revenue-producing exhibitions and projects in excess of \$8,000,000. A further campaign effort was launched to finance additional physical improvements at the Zoo and Aquarium, and, as of June 30, \$539,245 had been contributed. Altogether, the Society's efforts raised \$6,643,505.

The City of New York continued its partnership with the Society by increasing support for Zoological Park and Aquarium operations to \$5,858,236, which accounted for 27 percent of general operating revenues. The City provided an additional \$1,493,000 toward capital project expenditures at these facilities. New York State provided \$970,950 through the Natural Heritage Trust; unfortunately, it was not able to continue its additional supplemental appropriation as in past years. Other government support included federal funds for education and marine science activities.

Visitor attendance increased 3 percent at the Zoo, reflecting an increase in the number of school trips over the previous year. With the Zoo's free admission policy on Tuesdays, Wednesdays, and Thursdays, 57 percent of all visitors entered without paying admission fees. Attendance at the Aquarium remained level, notwithstanding substantial renovations which were underway throughout much of the year. Attendance at both facilities totaled 2,492,939 people, and admission fees of \$2,284,979 provided 11 percent of general operating funds. Visitor per capita spending increased 6 percent at the Zoo and 12 percent at the Aquarium.

Membership dues and travel revenues generated 5 percent of general operating funds, as did the combined revenues of *Animal Kingdom* magazine and educational and other programs. Interest and dividend income accounted for 8 percent. The total

return on the Society's portfolio for the last twelve months was about in line with the overall market averages. Since the selection of Neuberger & Berman as the Society's portfolio manager in April 1980, the total return, on an annualized basis, stood at 28.3 percent. This performance placed the Society's portfolio in the top fifteenth percentile of such funds.

### Expenditures

Indicative of its service nature, over one-half of the Society's expenditures for general operations were represented by personnel costs. A mild heating season resulted in only a modest increase in the Society's overall utility costs, 82 percent of which were funded by the City; however, mandated cost increases did continue in such areas as payroll taxes, telephone, and postage. Cost of goods sold for visitor operations increased in line with revenues.

### Capital projects

During fiscal 1983, sixteen capital projects were being actively pursued. At the Zoological Park, a new camel barn was erected near Wild Asia. More than \$1,000,000 was expended for exhibit work in the Jungle World building, scheduled to open in the spring of 1985. Construction was begun on the new animal hospital, and a feasibility study to determine the economic impact of cogenerated power produced at the Zoo was substantially completed. With the generous assistance of The Vincent Astor Founda-



Young cranes get needed exercise at the Zoo with the help of volunteer walkers.

tion, the Society also initiated a study to determine the future of the Zoo Court.

At the Aquarium, the new Marine Mammal Holding Facility (built largely with City funds) was opened, and reconstruction of the whale tank was completed. Architectural and design work continued on the new Discovery Cove, and planning was initiated for a new seawater system and expansion of the existing penguin and seal pools.

The City Zoos Project (encompassing the Central Park, Prospect Park, and Flushing Meadows zoos) accounted for more than \$2,000,000 of private Society capital outlay. Plans for the complete renovation of the Central Park Zoo are expected to be submitted to the City this fall.

#### Outlook

The Society continues to reach more and more people as it seeks to fulfill its commitment to wildlife education, research, and conservation. Government funding for operating and capital expenditures continues

and remains substantial. These funds, however, only provide for approximately one-third of the Society's needs. Fortunately, they are generously supplemented by the Society's supportive constituency.

The City Zoos Project offers an opportunity to expand Society services and other educational efforts to a far broader audience. The tradition of joint public and private support has enabled the Zoological Society's services and programs to flourish for eighty-eight years. Now, as the Society expands its local, national, and international role, it is more important than ever that this cooperative effort be sustained.

**David T. Schiff**  
Treasurer



**Peat, Marwick, Mitchell & Co.**  
Certified Public Accountants  
345 Park Avenue  
New York, NY 10154

The Board of Trustees  
New York Zoological Society

We have examined the balance sheet of New York Zoological Society as of June 30, 1983 and the related statements of support and revenue, expenditures, capital additions and changes in fund balances and of changes in financial position for the year then ended. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

As explained in note 1 to the financial statements, expenditures for land, buildings and equipment are not capitalized, and depreciation of buildings and equipment is, therefore, not recorded. Such practices are not in accordance with generally accepted accounting principles.

In our opinion, except for the effect on the financial statements of the matter discussed in the preceding paragraph, the aforementioned financial statements present fairly the financial position of New York Zoological Society at June 30, 1983 and the results of its operations and the changes in its financial position for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

*Peat, Marwick, Mitchell & Co.*  
September 9, 1983

**New York Zoological Society**  
**Balance Sheet**  
June 30, 1983

<b>Assets</b>	<b>Operating funds</b>	<b>Endowment funds</b>
Cash	\$ 1,155,080	—
Investments (note 2)	11,062,872	16,304,279
Accounts receivable	511,819	—
Grants and pledges receivable	1,728,105	—
Inventories, at lower of cost or market	324,389	—
Prepaid expenses and deferred charges	391,727	—
	<u><b>\$15,173,992</b></u>	<u><b>16,304,279</b></u>
<b>Liabilities and fund balances</b>		
Accounts payable and accrued expenses	2,086,494	—
Accrued employee benefit costs	827,908	—
Deferred restricted support and revenue (note 5)	5,009,017	—
	<u>7,923,419</u>	<u>—</u>
Fund balances:		
Unrestricted:		
Designated for long-term investment	6,066,674	—
Undesignated	1,183,899	—
Endowment:		
Income unrestricted	—	2,965,209
Income restricted	—	4,708,240
Term endowment—income unrestricted	—	8,630,830
	<u>7,250,573</u>	<u>16,304,279</u>
	<u><b>\$15,173,992</b></u>	<u><b>16,304,279</b></u>

*See accompanying notes to financial statements.*

Zachary, born to Farrah on March 24, 1983, was a lively attraction at the new camel barns.



**Statement of Support and Revenue, Expenditures, Capital Additions, and Changes in Fund Balances**  
Year ended June 30, 1983

	Operating funds			Endowment funds
	General	Capital outlay	Total	
Operating support and revenue:				
Contributions and fund raising events, net (note 3)	\$ 2,667,137	3,224,964	5,892,101	—
Government support:				
City of New York (note 8)	5,858,236	—	5,858,236	—
Other	1,104,102	—	1,104,102	—
Admission charges	2,284,979	—	2,284,979	—
Visitor services revenues	5,825,702	722,764	6,548,466	—
Membership dues and travel	1,048,174	—	1,048,174	—
Endowment and other investment income (note 4)	1,801,096	—	1,801,096	—
Publications and related revenues	740,039	—	740,039	—
Education program revenues	153,157	—	153,157	—
Collection sales	—	104,718	104,718	—
Miscellaneous revenue	137,832	—	137,832	—
<b>Total operating support and revenue</b>	<b>21,620,454</b>	<b>4,052,446</b>	<b>25,672,900</b>	<b>—</b>
Expenditures:				
Program services:				
Zoological Park	9,607,243	1,740,896	11,348,139	—
Aquarium	2,143,748	263,982	2,407,730	—
Survival Center	183,578	—	183,578	—
Animal Research and Conservation Center	985,580	—	985,580	—
Marine Sciences	304,716	—	304,716	—
Publications	944,343	—	944,343	—
Visitor services and admissions	4,054,710	—	4,054,710	—
Membership activities	659,100	—	659,100	—
City Zoos project (note 7)	—	2,047,568	2,047,568	—
<b>Total program services</b>	<b>18,883,018</b>	<b>4,052,446</b>	<b>22,935,464</b>	<b>—</b>
Supporting services:				
Management and general	1,787,959	—	1,787,959	—
Fund raising	1,168,666	—	1,168,666	—
<b>Total supporting services</b>	<b>2,956,625</b>	<b>—</b>	<b>2,956,625</b>	<b>—</b>
<b>Total expenditures</b>	<b>21,839,643</b>	<b>4,052,446</b>	<b>25,892,089</b>	<b>—</b>
Excess of expenditures over operating support of revenue, carried forward	(219,189)	—	(219,189)	—



**Statement of Support and Revenue, Expenditures, Capital Additions, and Changes in Fund Balances (cont'd.)**

	Operating funds			Endowment funds
	General	Capital outlay	Total	
Excess of expenditures over operating support and revenue, brought forward	\$ (219,189)	—	(219,189)	—
Bequests	162,057	—	162,057	—
Realized net gains on investments	844,365	—	844,365	—
Excess of support and revenue over expenditures before capital additions	787,233	—	787,233	—
Capital additions:				
Contributions	—	—	—	3,251,364
Realized net gains on investments	—	—	—	1,760,435
Total capital additions	—	—	—	5,011,799
Excess of support and revenue over expenditures after capital additions	787,233	—	787,233	5,011,799
Fund balances at beginning of year	6,463,340	—	6,463,340	14,467,444
Other changes—expiration of term endowment (note 3)	—	—	—	(3,174,964)
Fund balances at end of year	<u>\$ 7,250,573</u>	<u>—</u>	<u>7,250,573</u>	<u>16,304,279</u>

*See accompanying notes to financial statements.*



Born on June 4, 1983, E.P. ("Extraordinary Pinniped") is thoroughly at home in the recently renovated pool for California sea lions.

**Statement of Changes in Financial Position**  
Year ended June 30, 1983

	Operating funds	Endowment funds
Resources provided:		
Excess of support and revenue over expenditures before capital additions	\$ 787,233	—
Capital additions:		
Contributions	—	3,251,364
Realized net gains on investments	—	1,760,435
Excess of support and revenue over expenditures after capital additions	787,233	5,011,799
Items which do not provide resources—realized net gain on investments	(1,008,949)	(1,760,435)
Decrease in accounts receivable	137,769	—
Proceeds from sale of investments	28,286,925	49,360,415
Increase in accounts payable and accrued expenses	527,625	—
Increase in accrued employee benefit costs	150,468	—
Decrease in inventories	162,058	—
Increase in deferred restricted support and revenue	2,992,908	—
Total resources provided	32,036,037	52,611,799
Resources used:		
Increase in grants and pledges receivable	819,947	—
Increase in prepaid expenses and deferred charges	74,453	—
Purchase of investments	32,797,535	49,436,815
Total resources used	33,691,935	49,436,815
Other changes—expiration of term endowment	—	(3,174,964)
Decrease in cash	<u><u>\$(1,655,898)</u></u>	<u><u>—</u></u>

*See accompanying notes to financial statements.*

**Notes to Financial Statements**  
June 30, 1983

**(1) Summary of significant accounting policies**

The financial statements of the Society have been prepared on the accrual basis except for depreciation as explained below. Other significant accounting policies follow:

**Fund accounting**

In order to ensure observance of limitations and restrictions placed on the use of available resources, the accounts are maintained in accordance with the principles of fund accounting. This is the procedure by which resources for various purposes are classified for accounting and reporting purposes into funds established according to their nature and purposes. Separate accounts are maintained for each fund; however, in the accompanying financial statements, funds that have similar characteristics have been combined into fund groups.

(continued)

## Notes to Financial Statements (continued)

The assets, liabilities and fund balances of the Society are reported in two self-balancing fund groups:

### Operating funds, which include unrestricted and restricted resources:

- Unrestricted funds represent the funds available for the support of Society operations.
- Funds restricted by the donor, grantor, or other outside party for particular operating purposes (including accessions and other capital additions) are deemed to be earned and reported as revenues of operating funds when the Society has incurred expenditures in compliance with the specific restrictions. Such amounts received but not yet earned are reported as restricted deferred amounts.

### Endowment funds, which include the following restricted resources:

- Funds that are subject to restrictions of gift instruments requiring in perpetuity that the principal be invested and only the income be used.
- Term endowment funds which must be held intact except that, at some future date or specified occurrence, some portion or all of the principal may be used [see note 3].

### Plant assets and depreciation

Expenditures of operating funds for plant acquisitions including buildings and improvements constructed on land owned by the City of New York are not capitalized and, accordingly, depreciation is not recorded in the Society's financial statements.

### Collections

Expenditures for collections are not capitalized.

### Other matters

All gains and losses arising from the sale, collection or other disposition of investments and other noncash assets are accounted for in the fund that owned the assets. Ordinary income from investments, receivables, and the like is accounted for in the fund owning the assets, except for income derived from investments of endowment funds, which is accounted for, if unrestricted, as revenue of the unrestricted operating fund or, if restricted, as deferred amounts until the terms of the restriction have been met.

Enforceable pledges for operating purposes, less an allowance for uncollectible amounts, are recorded as receivables in the year made. Pledges for support of current operations are recorded as operating fund support. Pledges for support of future operations are recorded as deferred amounts in the operating fund. Pledges to the term endowment fund are recognized upon payment of the pledge.

## (2) Investments

Investments are reflected at cost or fair market value at date of gift. The market value and carrying value of investments by fund at June 30, 1983 were as follows:

	Market value	Carrying value
Operating funds—expendable	\$13,867,809	11,062,872
Endowment funds—nonexpendable	21,366,933	16,304,279
	<u>\$35,234,742</u>	<u>27,367,151</u>

Details of investment assets at June 30, 1983 were as follows:

	Market value	Carrying value
Cash	\$ 81,264	81,264
Short-term investments	6,153,050	6,153,050
Corporate stocks	27,007,149	19,171,040
U. S. Government obligations	1,993,279	1,961,797
	<u>\$35,234,742</u>	<u>27,367,151</u>

## Notes to Financial Statements (continued)

Investment assets of endowment funds and operating funds are pooled on a market value basis with each individual fund subscribing to or disposing of units on the basis of the value per unit at market value, determined quarterly. Of the total units, each having a market value of \$213.01, 100,309 units were owned by the endowment funds and 65,103 units were owned by operating funds at June 30, 1983. The average earnings per unit, exclusive of net gains, approximated \$11.49 for the year.

The following tabulation summarizes changes in relationships between carrying values and market values of investment assets:

	Market value	Carrying value	Net gains (losses)	Market value per unit
End of year	\$35,234,742	27,367,151	7,867,591	213.01
Beginning of year	19,904,515	20,010,757	(106,242)	156.64
Unrealized net gains for year			7,973,833	
Realized net gains for year			2,769,384	
Total net gains for year			<u>\$10,743,217</u>	<u>56.37</u>

The New York State Not-for-Profit Corporation Law, which became effective on September 1, 1970, permits the use of gains on investment transactions of endowment funds. Such gains are currently being added to principal but may be utilized at the discretion of the Board of Trustees.

### (3) Term endowment

During 1976, the Society initiated a capital funds campaign. The campaign included a term endowment fund to serve various functions, as described below, subject to the following conditions:

(a) The income of the term endowment fund shall be used for the general operating purposes of the Society; and

(b) The principal of the term endowment fund may be expanded only upon the affirmative vote of two-thirds of the Trustees present at any duly held meeting of the Board of Trustees or its Executive Committee: (i) to finance programs or improvements to facilities (i.e., the Bronx Zoo, the New York Aquarium, or other facilities of the Society) to produce revenue or increase attendance; or (ii) to ensure the survival of the Society if funds from other sources fail to provide sufficient revenue to maintain the Society's programs; provided, however, that in the case of any contribution to the term endowment fund which was subject to a restriction not to expend the principal of such contribution without the prior consent of the donor thereof, in addition to the vote of the Trustees described above, such consent must be obtained in writing prior to the expenditure of such principal. For the year ended June 30, 1983, the Society recognized as operating support and revenue expired term endowments aggregating \$3,174,964. Such funds were utilized as follows:

City Zoos Project	\$1,818,893
Jungle World Building	739,643
Prospect Park Zoo	226,598
Central Court	131,586
Marine Mammal Holding Facility	90,982
Whale Tank Renovation	57,173
Discovery Cove	44,982
Animal Hospital	41,315
Sea Water System	15,382
Penguin Pool Expansion	5,412
Snow Leopard Exhibit	2,548
Flushing Meadows Zoo	450
	<u>\$3,174,964</u>

Pledges to the term endowment fund aggregating approximately \$889,000 are due to be collected over the next two fiscal years.



## Notes to Financial Statements (continued)

### (4) Pension plan

All eligible Society employees are members of the Cultural Institutions Retirement System's (CIRS) Pension Plan. Pension expense was approximately \$900,000, of which approximately \$453,000 was financed by an appropriation from the City of New York. The current year's provision includes amortization of prior service costs over a period of 30 years commencing June 30, 1974. The Society's policy is to fund pension cost accrued and no unfunded vested benefits existed as of June 30, 1981, the date of the latest plan valuation.

Because the CIRS Plan is a multi-employer plan, certain information as it relates to vested and non-vested benefits as well as plan assets is not readily available.

Certain employees of the Society were formerly participants in the Society's pension fund. Effective January 1, 1975, benefits of the CIRS Plan were substituted for benefits previously accrued under the Society's pension fund. The market value of the assets of the pension fund approximated \$2,450,000 as of June 30, 1983 and exceeded the past service liability associated with the participants of the former plan. It is intended that these assets be used to fund current pension costs. During 1983, \$113,000 of investment income is reflected in the financial statements.

### (5) Deferred restricted support and revenue

The changes in deferred restricted support and revenue for the year ended June 30, 1983 are as follows:

Balance at beginning of year	\$2,016,109
Additions:	
Contributions and fund raising events	3,873,898
Fees and grants from governmental agencies	273,834
Investment income	401,688
Net gain on investment transactions	164,584
Other	144,962
	<u>6,875,075</u>
Less funds expended during year	<u>1,866,058</u>
Balance at end of year	<u><u>\$5,009,017</u></u>

### (6) Collections

During the year ended June 30, 1983, accessions of collections aggregated approximately \$242,000 while deaccessions aggregated approximately \$105,000.

### (7) City Zoos Project

The Society and the City of New York have entered into agreements with respect to the Central Park Zoo, Prospect Park Zoo, and Flushing Meadows Zoo. Each agreement provides for the City's renovation of these zoos in accordance with plans developed through consultation with the Society and approved by the City, and thereafter, for the Society's operation and management of each with funding from the City, for an initial 50-year term, renewable by the Society for five additional 10-year terms. Through June 30, 1983, the Society had expended approximately \$2,800,000 for this purpose.

### (8) City of New York support

The City of New York, in addition to providing general operating support through the Department of Cultural Affairs, expended \$480,000 at the Zoological Park and \$1,013,000 at the Aquarium for capital projects. Such amounts are not included in the accompanying financial statements.

# Contributions, Pledges, and Payments on Pledges of \$1,000 and Over

## Individuals and Foundations

Louis & Anne Abrons Foundation, Inc.  
The Achelis Foundation  
AKC Fund, Inc.  
Dewey Allen  
The M.L. Annenberg Foundation  
The Armand G. Erpf Fund  
Estate of Ada B. Arnold  
Mrs. Vincent Astor  
The Vincent Astor Foundation  
Isabel H. Ault  
Rose M. Badgley Residuary Charitable Trust  
The George F. Baker Trust  
Mr. and Mrs. George F. Baker III  
J.M.R. Barker Foundation  
The Theodore H. Barth Foundation  
The Howard Bayne Fund  
Mrs. F. Henry Berlin  
The Bernhill Fund  
Mrs. Harry A. Birnbaum  
Mrs. H. Lawrence Bogert  
Mrs. Albert C. Bostwick  
Joseph G. Bradley  
Mr. and Mrs. Lawrence E. Brinn  
Douglas F. Bushnell and Betty Wold Johnson  
The Louis Calder Foundation  
Mrs. James Walter Carter  
Guy Cary  
Daniel R. Childs  
The Clark Foundation  
Cobble Pond Foundation Trust  
Mr. and Mrs. Hyman Cohen  
Constans Culver Foundation  
Ida Coppola  
Joseph F. Cullman 3rd  
Mr. and Mrs. Allerton Cushman  
The Dammann Fund, Inc.  
The Dillon Fund  
Mr. and Mrs. Al De Matteis  
Mrs. W. Palmer Dixon  
Gerladine R. Dodge Foundation  
Mr. and Mrs. Thomas J. Doherty  
Mr. and Mrs. A. Stone Douglas  
The Max and Victoria Dreyfus Foundation,  
The Doris Duke Foundation  
The Dunlevy Milbank Foundation Inc.  
Virginia Dwan  
The Dyson Foundation  
Mr. and Mrs. Lawrence Eisele  
John Elliott, Jr.  
Blanche T. Enders Charitable Trust  
Mrs. Charles W. Engelhard  
The Charles Engelhard Foundation  
Mr. and Mrs. Thomas M. Evans  
Mr. and Mrs. William Ward Foshay  
Foundation for the Needs of Others, Inc.  
Mrs. Henry Fowles  
Dr. and Mrs. Henry Clay Frick II  
Louis Gargiulo  
Anne C. Getty  
Mr. and Mrs. Richard Gilder, Jr.  
Bernard F. and Alva B. Gimbel Foundation, Inc.  
Mr. and Mrs. Robert G. Goclet  
Thomas Goclet  
Herman Goldman Foundation  
Gerald M. Gordon  
The Gordon Fund  
Mr. and Mrs. Edmund Greco  
The Greenwall Foundation  
The Griffiths Foundation, Inc.  
Mary Livingston Griggs and Mary Griggs  
Burke Foundation  
The Paul Guenther Fund  
Thomas H. Guinzburg  
Mrs. Alexander S. Haig  
Mr. and Mrs. James R. Halperin  
Mrs. Peta Paull Handel  
Gladys F. Harriman  
Mary W. Harriman Foundation

The Mattie Wattis Harris Foundation  
Mrs. Ridgely W. Harrison  
Margaret Milliken Hatch Charitable Trust  
Enid A. Haupt  
Laurin Hall Healy  
Mr. and Mrs. John R. Hearst, Jr.  
Justus Heijmans Foundation  
Mrs. George L. Hinman  
Audrey P. Holden Charitable Trust  
Mr. and Mrs. Jack R. Howard  
Mr. and Mrs. John N. Irwin II  
John N. Irwin III  
Estate of Marie E. Jerke  
Howard Johnson Foundation  
Mr. and Mrs. Franklin R. Kellogg  
David and Phyllis Kennedy Foundation  
Estate of Pauline Kerr  
Killock Fund  
Mrs. Joseph H. King  
Robert J. Kleberg, & Helen C. Kleberg  
Foundation  
The Knapp Foundation  
Mrs. Samuel W. Lambert, Jr.  
Mr. and Mrs. Frank Y. Larkin  
Royal Little  
The Alexander M. & Judith W. Laughlin  
Foundation  
Mrs. John H. Livingston  
Laurence D. Lovett  
The Joe and Emily Lowe Foundation, Inc.  
The Mandeville Foundation, Inc.  
Frank L. Mansell  
Alastair B. Martin  
Michael T. Martin  
William McChesney Martin  
The Joseph P. Martinson Memorial Fund  
Otto Marx, Jr.  
The Helen R. and Harold C. Mayer  
Foundation, Inc.  
Mr. and Mrs. John Mayer  
David Hunter McAlpin  
The Atholl McBean Foundation  
Edith McBean  
Mr. and Mrs. Jay H. McDowell  
John L. McHugh Foundation, Inc.  
John McIlhenny  
Walter McIlhenny  
R.K. Mellon Family Foundation  
Mr. and Mrs. John Daniel Mitchell  
Leo Model Charitable Remainder Trust

William T. Morris Foundation  
Henry and Lucy Moses Fund, Inc.  
Mr. and Mrs. George K. Moss  
Mr. and Mrs. Robert Newburger  
Mr. and Mrs. Charles W. Nichols, Jr.  
Nichols Foundation, Inc.  
Edward John Noble Foundation  
Jessie Smith Noyes Foundation, Inc.  
Mr. and Mrs. Augustus G. Paine  
George Eustis Paine  
Lucile B. and Marcel A. Palmaro Fund  
Moses L. Parselsky Foundation  
The Perkins Fund  
Mr. and Mrs. Richard T. Perkin  
Mr. and Mrs. Milton Petrie  
Linda Peyton  
Mr. and Mrs. Howard Phipps, Jr.  
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Grace Davall, *Curator Emeritus*  
Roland Lindeman, *Consultant, Mammal Management*  
Giuseppe de Campoli, Jean Delacour, Ostrom Enders, Winston Guest, Jr., Frank Y. Larkin, William K. Macy, Jr., S. Dillon Ripley, Charles Sivel, Charles D. Webster, *Field Associates in Ornithology*  
William H. Zovickian, *Field Associate in Herpetology*

## New York Aquarium

George D. Ruggieri, S.J., *Director*  
Louis E. Garibaldi, *Associate Director*  
Erwin J. Ernst, *Curator*  
Robert Hayden, *Assistant Director of Operations*  
Karen A. Hensel, *Curator, Education*  
Paul J. Cheung, *Pathologist*  
Klaus D. Kallman, *Fish Geneticist*  
Robert Jansen, *Manager, Security*  
Fran Lupo, *Manager, Visitor Services*  
Donald McHugh, *Buildings Manager*  
John J. Scaturro, *Coordinator, Aquarium Development*

## Osborn Laboratories of Marine Sciences

George D. Ruggieri, S.J., *Director and Experimental Embryologist, Carter Chair of Marine Sciences*  
Ross F. Nigrelli, *Senior Scientist*  
Betty Borowsky, *Invertebrate Zoologist*  
Paul J. Cheung, *Pathologist*  
Anthony D'Agostino, *Invertebrate Biologist*  
Klaus D. Kallman, *Fish Geneticist*  
Naftali Primor, *Toxicologist*

## Research Associates

Eli D. Goldsmith, *Scientific Consultant*  
C.M. Breder, Jr., *Ichthyology*  
John A. Chamberlain, Jr., *Paleobiogeology*  
Joseph Gennaro, *Electron Microscopy*  
Myron Jacobs, *Cetacean Neuroanatomy*  
Martin P. Schreibman, *Fish Endocrinology*

## Wildlife Survival Center

James A. Murtaugh, *Associate Curator in Residence*  
Alfred J. Valenzuela, *Assistant Curator of Ornithology*  
John Iaderosa, *Zoologist*  
Morton S. Silberman, *Clinical Curator*  
Royce Hayes, *Superintendent, St. Catherine's Island*

## Animal Research and Conservation Center

George B. Schaller, *Director and Research Zoologist*  
Archie Carr, III, *Assistant Director*  
David Western, *Resource Ecologist, Carter Chair of Conservation Biology*  
Thomas Struhsaker, *Research Zoologist*  
William Conway, *Senior Conservationist*  
Donald F. Bruning, *Scientific Fellow, ARC Travel Program*  
Andrew Robertson, *ARC Travel Manager*  
Walter Auffenberg, David and Gillian Gillison, Lysa Leland, R.P. Malpas, Shirley Strum, Arturo Tatak, Alvaro Ugalde, *Conservation Fellows*  
Thomas Butynski, Tim W. Clark, Eleanor Dorsey, John Fryxell, Jesse C. Hillman, Dale M. Lewis, Cynthia J. Moss, Katharine Payne, Roger Payne, Howard Quigley, Alan Rabinowitz, A.R.E. Sinclair, Keith Williams, *Research Fellows*

## Animal Health

Emil P. Dolensek, *Veterinarian*  
Janet Stover, *Associate Veterinarian*  
Jay Tappe, *Pathology Resident*  
Wendy Westrom, *Reproductive Physiologist*  
Lyndall Erb Meuli, *Endocrinologist*

## Consultants

Raymond Napolitano, *Microbiology*  
Lucy Clausen, *Parasitology*  
Roy Bellhorn and Paul Henkind, *Ophthalmology*  
Henry Clay Frick II, *Obstetrics and Gynecology*  
Stephen A. Schwartz, *Pediatrics*  
Richard Lee, *Internal Medicine*  
Harold S. Goldman, *Radiology*  
John Budinger, *Pathology*  
Robert Byck, *Pharmacology*  
Jacques Wallach, *Clinical Pathology*  
James F. Grillo, *Surgery*  
Julie Kazimiroff, *Dentistry*  
Animal Medical Center, *Pathology*



Happy and Grumpy in a moment of self-reliance.

## Recommended Form of Bequest

The Trustees of the Society recommend that for estate planning purposes, members and friends consider the following language for use in their wills:

"To the New York Zoological Society, a not-for-profit, tax-exempt membership organization incorporated by the laws of the State of New York in 1895, having as its principal address the New York Zoological Park, Bronx, New York 10460, I hereby give and bequeath \_\_\_\_\_ for the Society's general purposes."

In order to prevent the Society from incurring future administrative cost, it would be helpful if you would consider adding the following language to any restrictions you may wish to impose on your bequest:

"If at some future time, in the judgment of the Trustees of the New York Zoological Society, it is no longer practicable to use the income or principal of this bequest for the purposes intended, the Trustees have the right to use the income or principal for whatever purpose they deem necessary and most closely in accord with the intent described herein."

If you wish to discuss the language of your bequest with a member of the Society's staff, please be in touch with the President's office, (212) 220-5155.

Howard Phipps, Jr.  
President







